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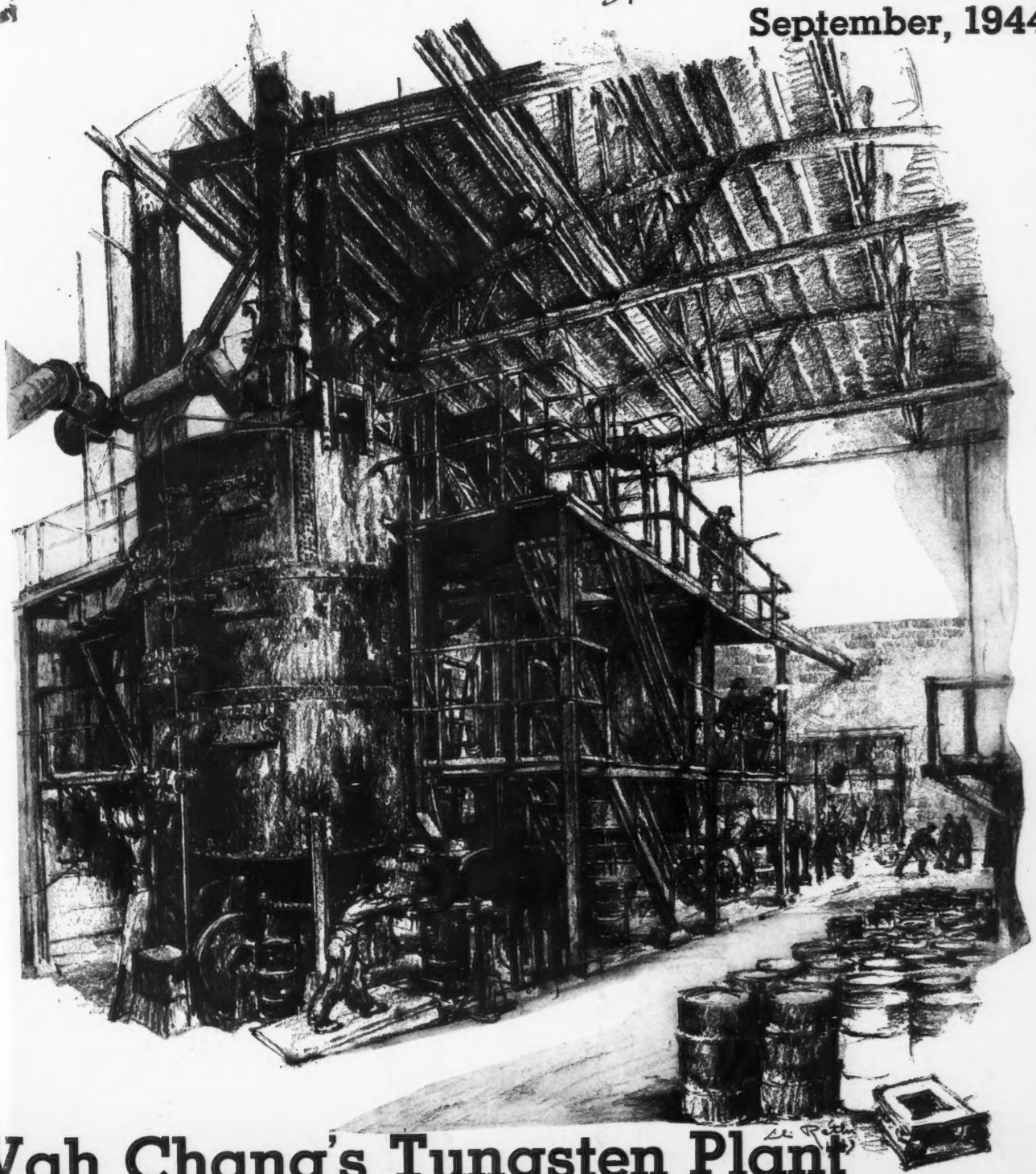
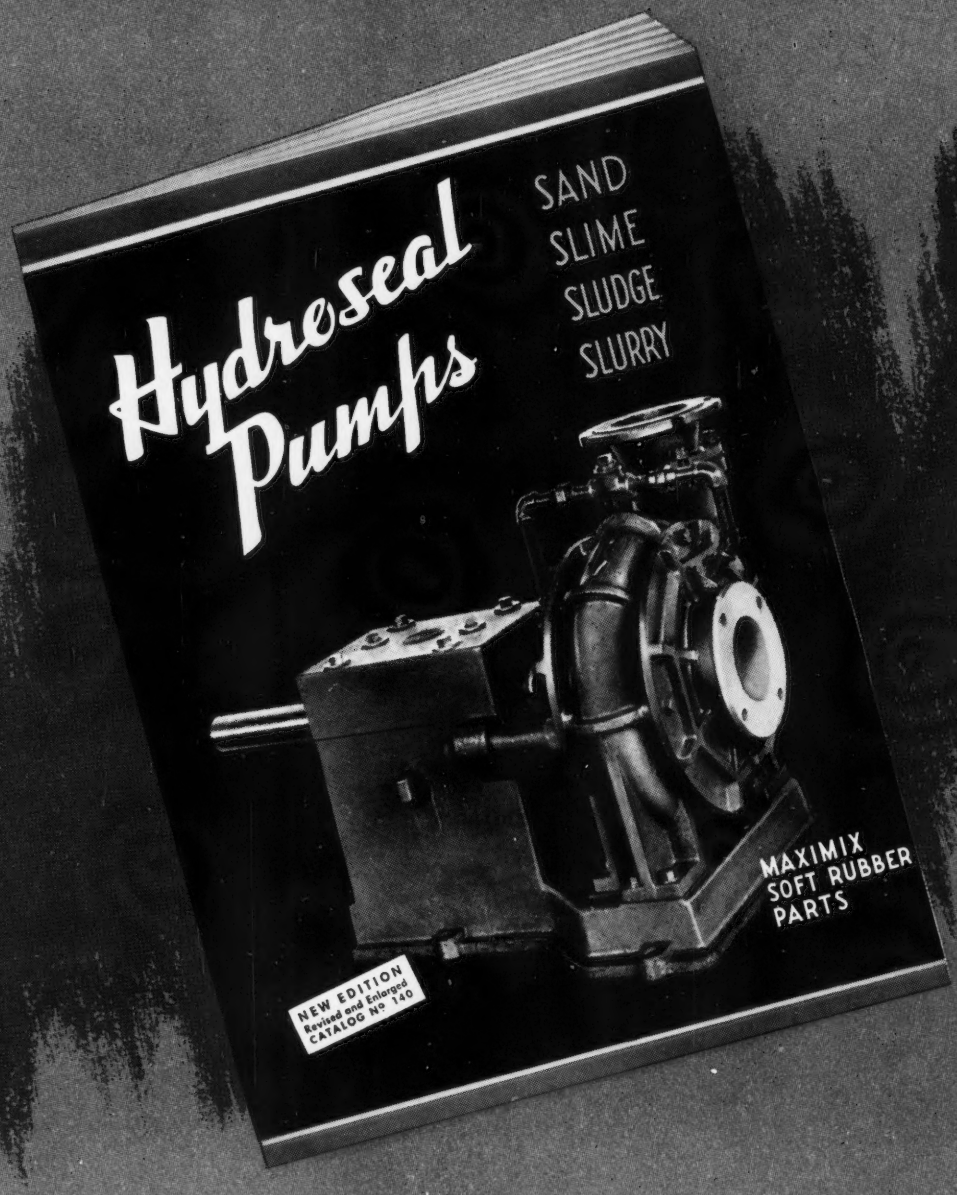


Wah Chang's Tungsten Plant



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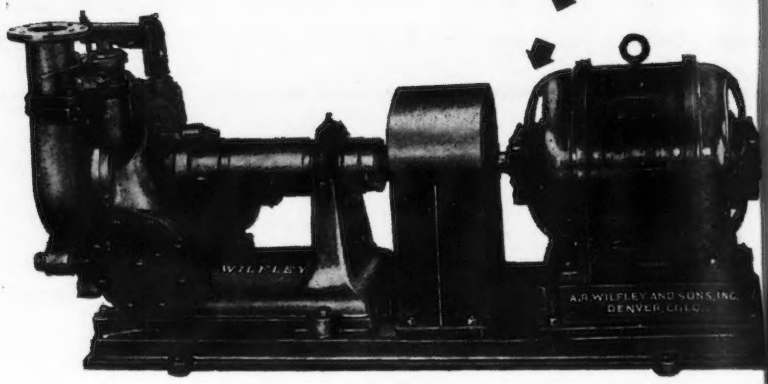

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ENGINEERING AND MINING JOURNAL

Evan Just, Editor

Mining Industry's Part in Reconversion

BEFORE LONG, possibly in a few weeks, hardly more than a few months, X-day will arrive. Then we shall rejoice that the Nazi beast is destroyed, and that the lives of our fine young fighting men will no longer be committed to destruction in the fiery furnace of Europe's battlefields. Over most of the earth people can resume the peaceful and constructive activities so long suppressed. Having the Jap still to dispose of will still engage a substantial portion of our military forces and productive capacity, but a good start can be made toward peacetime activities.

But we also face grave responsibilities. To succeed in the task of reconversion back to the ways of peace will demand as much or more skill, leadership, and devotion as did the miracle of conversion to war production. Without belittling that magnificent achievement in the least, by comparison it had the spur of patriotic ardor and the tremendous stimulus of Uncle Sam's lavishly used purse.

During the war effort we have developed countless ways to improve efficiency. Millions of people have been taught new skills and have grown accustomed to higher wages and better living. All at once, when X-day dawns, government purchases will shrink from 90 to 50 billion dollars per year, about 20 million war workers will become unemployed, many in places where there is small hope for peacetime employment, and more than 200,000 men per month will be mustered out of military service and looking for jobs. Also the cleavages, racial, industrial, political, and social, which have been held in check by force or patriotism, will burst out of bondage like the contents of Pandora's box. People will simply be harder to hold in check. Until a normal flow of goods develops, it will be a colossal and thankless task to prevent black-market buying from squandering the precious liquid assets on which so much of our hope for postwar prosperity depends.

Unfortunately, no matter how lively the demand for goods, it takes time to convert many industries and to relocate workers.

After we bridge the reconversion period there is every reason to expect from two to ten years of prosperity, providing that we reconvert efficiently and do not permit inflation to dissipate our savings. But during the task of refitting, unemployment might become a bogey that would freeze confidence and discourage spending. If we develop a depressive spiral as a result of fear, the consequences may be serious. To avert this it is vital to have jobs—as many jobs as possible.

It will be a time when the nation must rely on the determination of millions of good American citizens to do their several parts to keep the boat from rocking.

WHAT CAN THE MINING INDUSTRY DO TO HELP?

1. We can make a strong effort to compose differences between management and labor, and to provide the leadership that will make both sides understand that their interests are more mutual than in opposition.

2. We can try to fit our thinking to the national picture and the modern world, shunning the counsel of those who foment class or sectional hatreds and purely selfish thinking.

3. We can do our everlasting best to provide jobs.

How can we make jobs in the face of cutbacks and mineral surpluses? Any informed person knows that the industry cannot produce in excess of the demand for its output without "going broke" in very short order. But we can take heart and insist that surpluses be wisely handled. The productive-consumptive capacity of this country has so grown (*E.&M.J.*, Dec., pp. 69–70) that we can face the future with reasonable hope that there will be a demand for the fruits of new investments.

A study of annual reports shows that the mining industry is currently "pretty well heeled."

It can explore. Whether in this country or elsewhere, resources are not all discovered.

It can develop. Most of the country's mines are behind in development work. To catch up in development work alone would carry a good portion of the industry over the reconversion period.

It can modernize. Facing the necessity of using the bulky "skim milk" remainder of many of our mineral deposits, and supporting higher wage scales than foreign competition, every effort must be made

to modernize methods and plants, and reach the highest possible efficiency.

If we don't invest, and all the other men who can provide jobs don't do the same, the expanded industrial capacity of this country may harbor another portent. Eleven million soldiers are not going to tolerate mass unemployment in our interdependent economic structure. Uncle Sam will be called upon to furnish the needed jobs that private enterprise fails to provide. In such a case what happens to markets, competition, and profits? What happens to our colossal debt if the taxpayer must shoulder industrial deficits? We can stake our wealth on the future with at least the knowledge that if jobs are not provided, as capitalists, large or small, we shall lose our shirts anyway.

Active Development Impending in Latin America

FOR THE PAST FIVE YEARS in particular, *Engineering and Mining Journal* has directed attention to the mineral resources of Latin America, believing (1) that they would be greatly needed in the war effort, and (2) that they offered opportunities for judicious investment and development by American mining capital. The first of these convictions has been fully demonstrated; the second has been realized only in part and still merits consideration.

Evidence is multiplying that Latin America itself is more than ever alive to its own mineral wealth and is taking steps to develop it. Significant straws in the wind are the expansion of power facilities and the improvement of means of transportation—both highly essential to the growth of a country's economy. One has only to recall the rapid development of our own West to realize what these two facilities can do for many of the sparsely settled and relatively undeveloped countries in the Southern Hemisphere.

In the field of power, for example, Brazil is planning to double the capacity of its present hydroelectric plants, which now generate more than one million kilowatts. The program calls for new projects or expansion of existing plants in half a dozen Brazilian states. Of special interest to the mining industry are two sizable projects in the Rio Pardo basin and the Rio Doce valley in the mineral-rich State of Minas Geraes.

New air routes will link all the American republics when international agreements can be made after the war. The United States Civil Aeronautics Board has tentatively outlined twenty basic world air routes which it considers desirable for postwar commercial development by domestic air lines. It is significant that all twenty of the other American republics are included in twelve of these basic routes. In fact, about half of the 100 applications already made by United States air lines to operate international air transport include lines to, through, or from Latin American countries. The establishment of airports will stimulate the construction of highways and the improvement of feeder roads, all to the end of facilitating distribution of goods and services and a general rise in living standards.

Capital strength and outstanding technical skill give our mining industry an exceptional opportunity to participate in the development of Latin America. In making mining investments in those countries, if emphasis is put on participation with local capital rather than on complete acquisition of resources, then American men, money, and materials are likely to be more welcome and less subject to restriction.

Beyond doubt, Latin America is going to develop rapidly in the next decade. Will our mining industry participate vigorously, or sit on the sidelines and watch others do the job?

Night-Shift Decision Is Commendable

IT RESTORES SOME FAITH in our national tribunals to observe that the War Labor Board has reversed the decision of the Nonferrous Metals Commission, affecting night-shift compensation in a number of Western mining operations (p. 99).

The decision of the Commission was one of the strangest in our experience. In response to a plea for a wage premium to compensate for night-shift work, a differential of 25¢ per shift was granted. Then, based upon some vague findings that the existence of night-shift work was a source of inconvenience or loss to all workers in an operation, the Commission decided to grant the increase to all labor in the affected operations, whether they work on night-shift or not. Thus, before completing the decision, the Commission wiped out the differential which it had set forth to recognize.

We believe that the most serious injury is done to democratic processes when any tribunal so acts as to convince large numbers of people that its findings are not impartial. We believe that this kind of justice will eventually harm even the individuals who are the immediate beneficiaries. Some of the decisions of the Nonferrous Metals Commission have made us and many other people who hope to be fair believe that it is more interested in partisanship than justice.

Therefore, we believe that the War Labor Board has done a progressive thing to reverse the decision of the Commission on this issue. The change

actually may not save the mining companies much money, as the substitute rates established for night-shift work are higher than the 25¢ per shift. Without undertaking to pass on the rectitude of night-shift differentials for each of the several operations involved, the new decision at least has some semblance to logic, whereas the former one seemed to reflect bias.

MILLING AROUND

Those producers who would like to have postwar continuance of government mineral subsidies will find food for thought in an incident which affected cotton early in August. Two important Southern mills got tired of losing money on politically priced cotton and went over to a competitive material—rayon.

The Treasury is lend-leasing silver to the Indian government, which in turn is selling the silver to its citizens at $1.06 per ounce in an effort to reduce inflation. No price between the two governments is mentioned; presumably repayment will be made in kind.

Some writer in the Belgian Information Center, New York, rhapsodized as follows concerning developments in the Congo:

" . . . The gigantic tin and copper mines work on 24-hour shifts; natives from the deep bush produce glittering towers of ingots for the machines of victory.

"Slowly but methodically, the industrious Belgians are achieving a miracle in the wilderness. The Administrators, collaborating with the local chiefs, have exterminated cannibalism and ritual murders."

All this despite meat rationing, no doubt. Compared to what is going on in the gentleman's homeland these days, mere cannibalism seems like a fairly innocent diversion. We advise the Congo natives to take a good look at Europe before going in too strongly for the white man's culture.

Lest our statement in the last issue over the salvaging of battlefield scrap confuse some readers, we will add that reclamation of brass shell and cartridge cases is proceeding systematically. Calibers over 40 mm. are reloaded, usually four or five times, defective rejects going to the melting pot. Cases of all the 50 caliber machine gun cartridges fired from airplanes and tanks are saved for melting. Most of the U. S. Army reloading or melting is done in this country.

The war has finally struck at one of the most intimate details of family life in America. The country is confronted with inadequate diaper service! Faced with this new crisis on the home front—and rear—WPB has anticipated "heavy autumn demands" and has boldly issued a priority list. Heaven help the Democrats in November if the diaper program develops a bad odor!

A wider use of secondary metals in quality products is claimed to be feasible if care is taken in application of a new type of spectrographic analysis. WPB is promoting the method because of the increased use of scrap metal, which has been introducing unusual contaminants into many uses. This problem has been given special attention by the Office of Production Research and Development.

Despite recent statements to the contrary in the usually reliable Satevepost, many Australian leaders are looking to closer ties with the U. S. than with Britain in the future. They hope that we will take an interest in Pacific investments, cultural and economic improvement, and military affairs. Many of them are worried over future implications of setting China up as a military power. Australia would welcome immigration from this country.

Speculative interest in gold-mine stocks and activity in prospecting for gold indicate that there are plenty of people who look for the price of gold to be increased.

Considering the well-filled "pipeline," the mounting returns of shell and cartridge cases, the end of summer absenteeism, and the probable early end of the European war, the trade was skeptical of Donald Nelson's prediction that stepped-up artillery programs would reduce the present 300,000 ton copper stockpile to 100,000 tons by July 1, 1945.

The forthright practices of Dr. Willard Dow, of Dow Chemical Co., command our respect. Smeared by the Truman committee as having participated in a vicious magnesium cartel, Dow challenged the committee, demanding that they prove the accusation or retract. The committee retracted.

More recently (p. 100), Dow has been publicly demanding that all controls be relaxed from magnesium and has presented good reasons to document his case. We would feel more comfortable about the future of private enterprise in America if there were more industrial leaders who would fight publicly for their industries.

Persons interested in the purchase of idle government plants and property should consult one of RFC's 31 regional offices. Full information is being put into the hands of regional offices in an effort to decentralize the disposal process as much as possible.

IN WAH CHANG'S WAREHOUSE, adjacent to its treatment plant, are stored tungsten concentrates or ores from many parts of the world. Undoubtedly the largest to be found anywhere, this stock is also the most varied.

Wah Chang's Unique Plant for Concentrating Tungsten

WITHIN 30 MILES of the heart of New York, on the bank of one of Long Island's creeks, is an unusual tungsten concentrating plant—the only one of its particular kind and the largest of any kind in respect to tonnage of tungsten concentrates handled. This is the plant of the National Reconditioning Company, operated and managed by Wah Chang Trading Corporation, of New York, well known for years as an importer of tungsten, antimony and other commodities from China. Wah Chang's chairman and chief engineer is the distinguished mining engineer, K. C. Li, discoverer of tungsten in China.

The plant's unique interest derives from several circumstances: Foremost, instead of concentrating tungsten ores as mined, it re-concentrates, or purifies, shipments of concentrates or semi-concentrates, which have been received from the mines where they originate. Supplementing ore-dressing processes with fusion and leaching where necessary, it is really a plant for purifying concentrates rather than for ordinary milling. It may be regarded as a refinery in which, as in tin smelting, the concentrates rather than the metal receive the major refining treatment.

Premier Tungsten Stock

What is undoubtedly the largest stock of tungsten anywhere is to be found in the warehouse where the concentrates received are stored. These shipments have come to the plant from such widely scattered sources as China, Bolivia, Argentina, Peru, Brazil, Mexico, Belgian Congo, French Indo-China, Siam, Burma, the Malay States, Portugal, Spain, and Canada, as well as from all parts of the United States. The concentrates are in the form of wolframite, scheelite, hubnerite, and ferberite, and are frequently mixed with cassiterite, bismutite, powellite, and other associated minerals.

Under such conditions the plant feed naturally varies greatly, containing many different combinations of tungsten minerals and impurities. Any routine treatment is practically impossible. The plant is operated therefore on the batch principle and is equipped to permit any treatment, or combination of treatments, desired.

Performing an important function in this establishment, in view of the variable feed, is the well-equipped analytical laboratory. This is sup-

plemented by a testing laboratory and pilot plant. The treatment plant itself comprises the following units:

A magnetic-separation plant with five large newly designed separators, having a capacity of 60 tons of concentrates per day.

An electrostatic separation plant.

A roasting plant with two Herreshoff furnaces, capable of handling 30 tons of concentrates per day.

A leaching plant with 8 tanks, two reconditioners, a drum filter and a series of filter presses and settling tanks, with an over-all capacity of 30 tons a day.

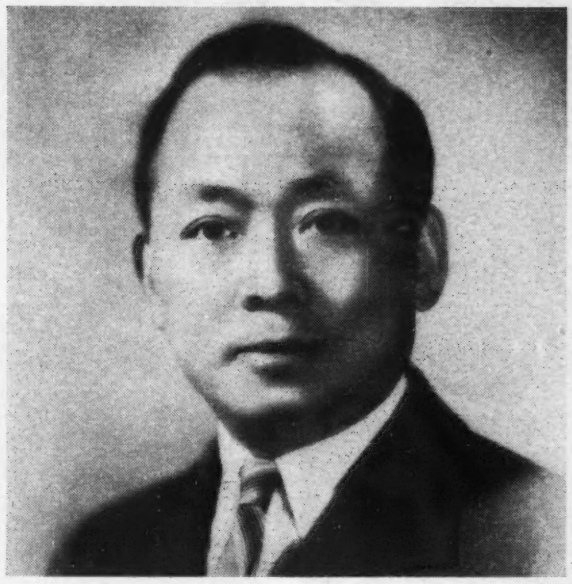
A flotation plant with a ball mill, thickening tanks, filter drums and press, able to treat 25 tons per day.

A drying plant with a baghouse with a capacity of 24 tons per day.

A fusion plant complete with boilers, furnaces, tanks, crystallizers, dryers, capable of treating 10 tons per day.

A sizing and crushing plant to serve the roasting, leaching, fusion and separation departments.

In addition, there is a large warehouse, with a sampling department, automatic scales and lifters.



K. C. LI

Plant design is such that each department is a separate and completely integrated unit. Finished products from a single lot of concentrates may be made in any one department or the lot may have to go to all departments depending upon the complexity of the concentrates and the impurities contained.

At the Start

Concentrates arrive in sewn burlap or canvas bags by cargo boat or railroad car. Handling is done either by hand trucks or lift trucks. Most of this material is a product of some combination of gravity, flotation, and magnetic concentration, and has already been dried. Sampling is thus simplified and is done by standardized methods by Ledoux & Company, who have an office and crew at the plant.

After being weighed and sampled the material is either

Wah Chang's Chairman an Important Factor in Tungsten Industry

K. C. LI (pronounced "Lee"), who serves as chairman and chief engineer of Wah Chang Trading Corporation, has had an interesting and distinguished career. Small and youthful in appearance, suave but energetic, he enjoys a prominent position in mining circles which he won for himself early in life. Mr. Li is credited with the discovery of tungsten in China and with the responsibility for making the first shipment of Chinese tungsten to the United States almost 30 years ago. Recognition also is accorded him as an authority on tungsten and antimony, he having served during World War I both the U.S. Government, under the War Industries Board, and the British Government, under the Imperial Munitions Board, as an expert.

In 1940, when the Council of National Defense, headed by E. R. Stettinius, Jr., undertook to consider the matter of acquiring supplies of strategic minerals, Mr. Li's advice was sought. Eventually Congress voted to stockpile more than a dozen such minerals.

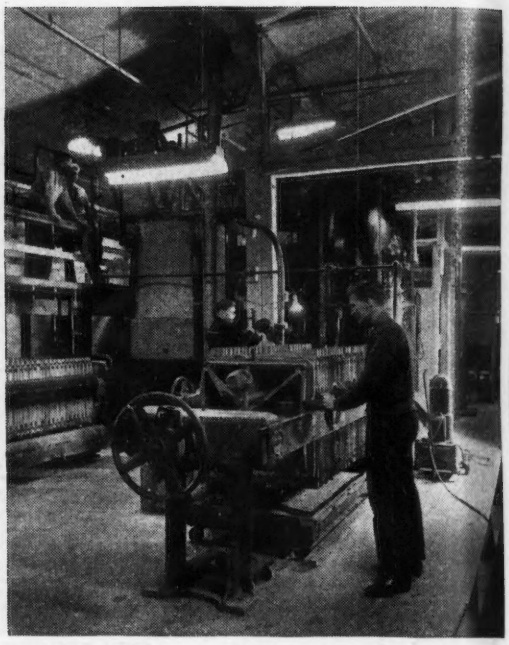
Meanwhile the French Empire collapsed and a large stock of tungsten owned and stored by China in French Indo-China awaiting shipment would have fallen into Japan's hands had not Mr. Li, acting upon advance information, sold it for China to this government. This stock was equivalent to two years' normal peacetime consumption in the United States.

Japan then bought tungsten heavily in South America, for her own account and Germany's. As early as 1940, Mr. Li had advised that South American production should be acquired, to counteract Axis purchasing and to insure the United States a supply, should shipments from China be stopped.

Tungsten produced in South America had not been purchased by the United States on account of its low quality. Mr. Li strongly advocated purchase of all off-grade ores there and elsewhere and actually made a trip to South America, during which he shipped a very large tonnage of tungsten concentrates to the United States, which was added to the Government stockpile. The off-grade ores, however, even a large part of the so-called high-grade concentrates, could not be directly charged into the furnaces. Mr. Li therefore established a concentration plant to purify such off-grade and other tungsten ores. This was erected in 1940 in the New York Foreign Trade Zone on Staten Island. Subsequently, this site having been commandeered by the Army, the present plant was built on Long Island. In Sonora, Mexico, Mr. Li likewise established Tungsteno Mexicano. S. A., which operates a concentrator.

After Pearl Harbor, the country was in urgent need of machine tools and high-speed steel. Every pound of tungsten had to be allocated. No consumer had any stock at all and the furnaces were in full blast awaiting tungsten, as Mr. Li had predicted. He is proud of the fact that not a single delivery has been delayed in Wah Chang's plant, which serves most of the country's needs, even when the site on Staten Island was taken by the Army and they had to move.

CHEMICAL ANALYSIS plays a vital part in the work of the concentrator and a modern laboratory (here seen in part) is provided where 15 analysts on three shifts turn out 150 to 175 analyses daily, depending upon constituents and method. Special equipment is also provided, as for quick colorimetric methods where there are no interfering constituents or quick sulphur determinations.



IN THE PILOT PLANT and in the testing laboratory equipment of varied sort is provided for determining the proper treatment to be given a particular ore or lot of concentrates in order to remove the impurities, as described in the text. Here are seen the filter presses.

phosphorus, arsenic, antimony and molybdenum.

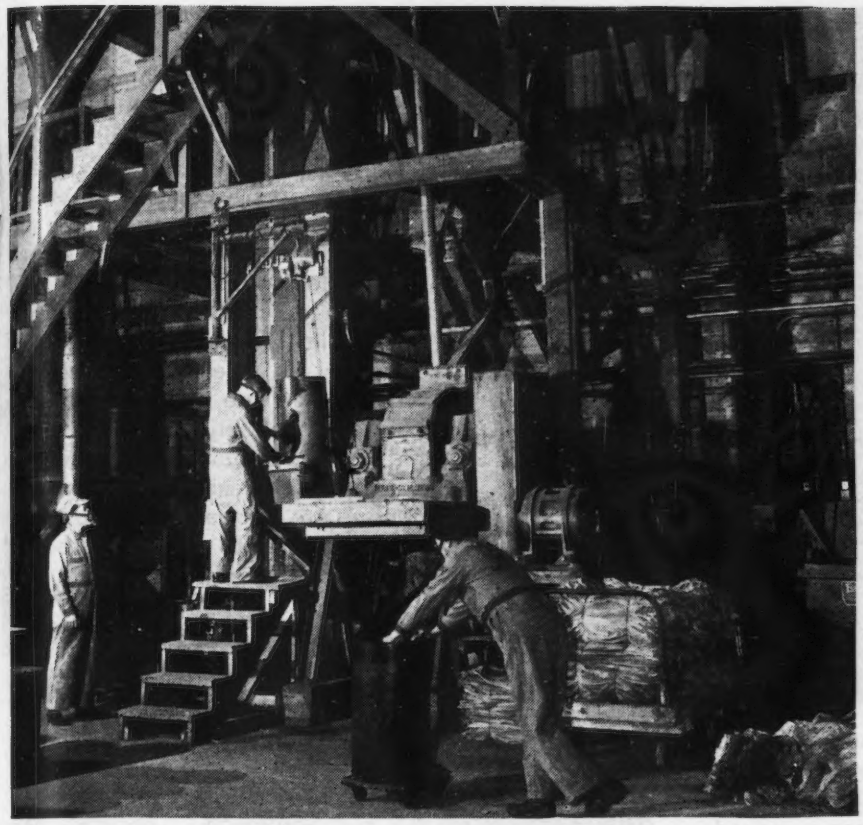
Rarely do concentrates received meet standard specifications, and they never meet special specifications without careful treatment. Specifications vary according to the processes and products of consumers. Tungsten metallurgy is still an art rather than a science, and the methods used, though based upon the same principle, vary greatly in details.

The actual effect of impurities is more a matter of opinion than of fact. Because of the great labor cost attendant upon the manufacture of finished tungsten products, particularly carbides, filament, wires, and anything for electronics, it is not surprising that producers prescribe rigid specifications for their raw material—the concentrates. For instance, for some of them molybdenum must be below 0.001 percent. When the assay reads, "Trace molybdenum," which is below 0.01 percent, the product is often rejected by some producers.

Refining procedure is determined according to the impurities present and the effect they will have on the finished product. Dependent upon the analysis and the results of preliminary work in the test laboratory and pilot plant, each lot of concentrates is finally assigned for treat-

Effect of Impurities in Tungsten Concentrates on Finished Products or on Operations

IMPURITY	EFFECT
Sulphur	AsFeS makes steel "red short."
Phosphorus	Makes steel "cold short."
Copper	Causes hot shortness. Also increases grain size of 13-percent tungsten steel.
Tin	Reduces cutting efficiency of high-speed steel and in small amounts lowers toughness at room temperature.
Arsenic and Antimony	Cause exceptional hot and cold shortness and unusual brittleness of cutting edge. Antimony more serious than arsenic in reducing tool life of finishing cuts.
Molybdenum	Causes short life of filament wire and contacts, due to ease of volatilization and oxidation.
Tantalum and Columbium	Tantalum not serious if extraction of WO_3 is by sodium carbonate fusion or caustic soda leaching. However, if fusion or leaching is with potassium compounds, the potassium tantalate is soluble and its oxide will be precipitated with tungstic oxide.
Lead	Lead and arsenic fumes during smelting are poisonous.
Bismuth	Bi, Sn, Sb, As, and P interfere with control of particle sizes and other physical characteristics of WO_3, which affect quality of tungsten powder reduced from such WO_3.
Silicates and Alumina	Their presence and oxides of alkali and alkaline earth metals interfere with control of crystal structure of metallic tungsten and thus lead to brittle products.

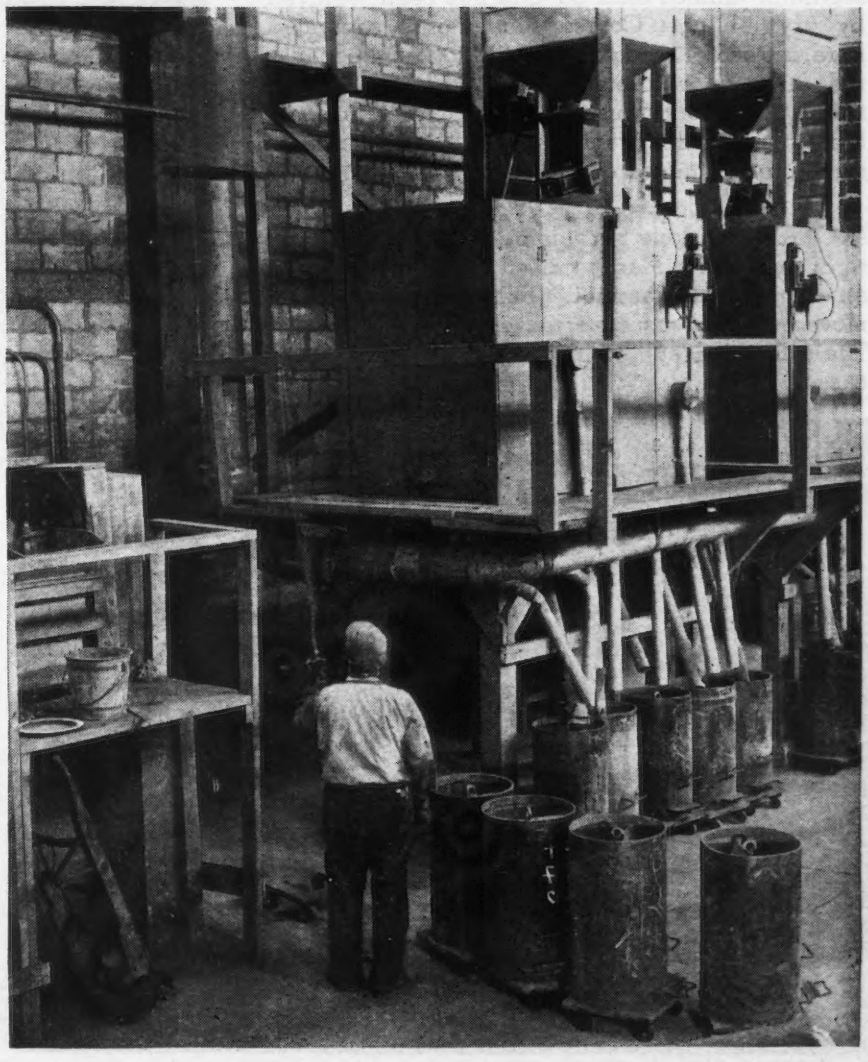


A Tour of the Plant by Camera

From the accompanying photographs and their captions, with the aid of the flowsheet, a comprehensive picture of this batch-processing tungsten plant and the varied operations conducted in it may be obtained.

This concentrator is a dry plant and is well equipped for collecting dust. At each point of fall there is a dust duct which is connected to a collector. Three such systems are used to permit segregation of different dusts.

In the magnetic separation department, as elsewhere, the hoppers of the machines are filled by means of transfer cans and the monorail hoist, the products being received in steel drums of 2 cu. ft. capacity. To what has been said in connection with the picture of the separators, it may be added that the magnetic products of the belts are discharged into split chutes so that weakly-magnetic particles and coarse minerals mechanically brushed from the main belt are



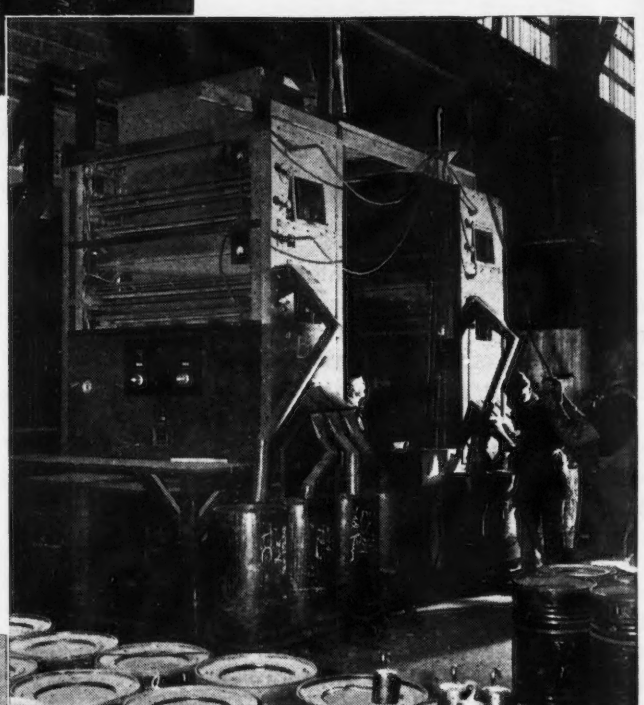
CRUSHING AND SIZING are essential for most concentrates before removal of impurities is attempted. The concentrates are elevated to a 20-mesh screen in closed circuit with rolls. Two such independent units are provided, likewise a jaw crusher for large lumps. Minus 20-mesh undersize is delivered in transfer cans holding 600 to 800 lb. by monorail hoist to hoppers feeding other screens having 20-, 40-, 60- and 80-mesh cloth, respectively, to make five sizes of feed for the magnetic separators. These do more work and make cleaner products on this closely-sized feed.

ment to one or more departments.

Mechanical treatment is ordinarily more economical than chemical treatment and is used wherever possible.

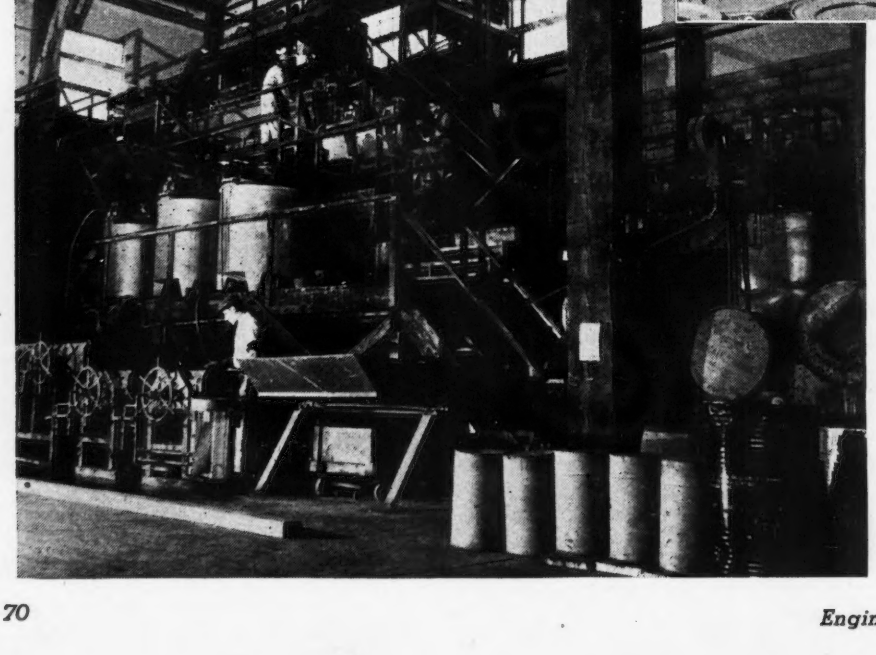
A generalized flowsheet illustrating procedures for the several classes of material is given. Other flowsheets for materials requiring removal of unusual impurities, or treatment for recovery of valuable materials other than those of tungsten and tin, can be followed in accordance with the procedures indicated by test work, and the types of concentrates. These are tabulated on page 66.

MAGNETIC SEPARATION is done in a department equipped with five, large, six-cross-belt, high-intensity separators of new design and having 18-in. main belts. Intensity is controlled by individual rheostats or by adjustment of a pole gap. By proper adjustments, strongly magnetic minerals, such as magnetite and pyrrhotite, are removed on the first one or two cross belts, less strongly magnetic minerals, as siderite and rhodochrosite, on the following cross belt, and magnetic tungsten minerals on the remaining cross belts. Scheelite, cassiterite, sulphides and gangue are discharged as tailings from the main conveyor belt. Middlings are returned.



ELECTROSTATIC SEPARATION, conducted on these two machines, is used to recover scheelite from plus-80 or 120-mesh fractions of magnetic separator tailings after gangue has been removed by dry tabling. Coarse scheelite is separated here, instead of being ground for flotation, because the ferro trade prefers a coarse product, fine flotation products dusting badly in the furnace. Electrostatic tailings and minus-80-mesh magnetic separation tailings are floated.

FLOTATION, done here, is preceded by grinding to 80 mesh in a Marcy mill in closed circuit with an Akins spiral classifier. Sulphides are then removed by the usual combinations of reagents. The scheelite-leaching circuit follows, after which cassiterite, if present, is depressed.



caught in the first section of the chute and returned for crushing.

The strongly magnetic products usually contain sufficient values to warrant further treatment. The magnetite and pyrrhotite may be cleaned on low-intensity separators, if the valuable minerals are merely entangled. But where tungsten and tin present are due to surface contamination, the concentrates are leached with sulphuric or hydrochloric acid, dried, and returned.

Iron and manganese carbonates are only slightly more magnetic than wolframite, and an important quantity of tungsten is ordinarily found in the product containing them. This may be separated by dry tabling

the coarse sizes and acid-leaching the fine sizes. Wolframite concentrates containing soluble impurities, or those which can be made soluble by roasting (as bismuth), are also leached.

In leaching scheelite, phosphorus is removed with hydrochloric acid. Calcite and dolomite, commonly found in flotation concentrates, are also removed by leaching. Bismuth present as oxide is likewise acid-soluble. Sulphides of arsenic and antimony are removed by leaching with caustic soda.

Each leaching cycle is followed by settling and decantation of the waste solutions. The product is finally washed and discharged to an agitator tank feeding an Oliver filter, which delivers its cake into an indirect-heat, helical screw drier.

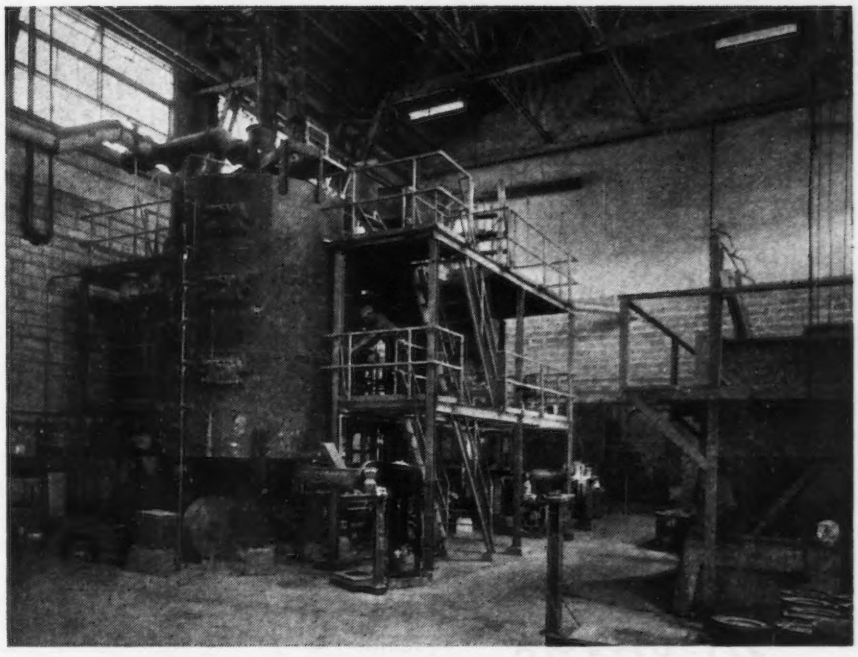
Decanted solutions are discharged to standard thickeners, one steel tank for alkali solutions, and one wood tank with wood mechanism for acid solutions. Settled slimes are periodically returned to leaching by Oliver slurry pumps. Overflow is filtered through Shriver plate-and-frame presses and sent to waste. The small amount of solids caught in the presses joins the underflow for re-leaching.

Close control of the acid leaching cycle is important, as small increases in the strength of the final acid solutions may cause prohibitive WO_3 losses. Solubility of scheelite in hydrochloric acid will depend upon the characteristics of the material leached, the size, and the impurities. For instance, if the scheelite contains much calcite, as it often does, the heat generated by the reaction affects the solubility of the scheelite. At the same time the free acid in the tanks must be between 1 and 2 percent to ensure removal of phosphorus. Somewhat higher concentrations are necessary in the bismuth leach to prevent hydrolysis to bismuth oxychloride and consequent re-precipitation.

Plant Benefits Many

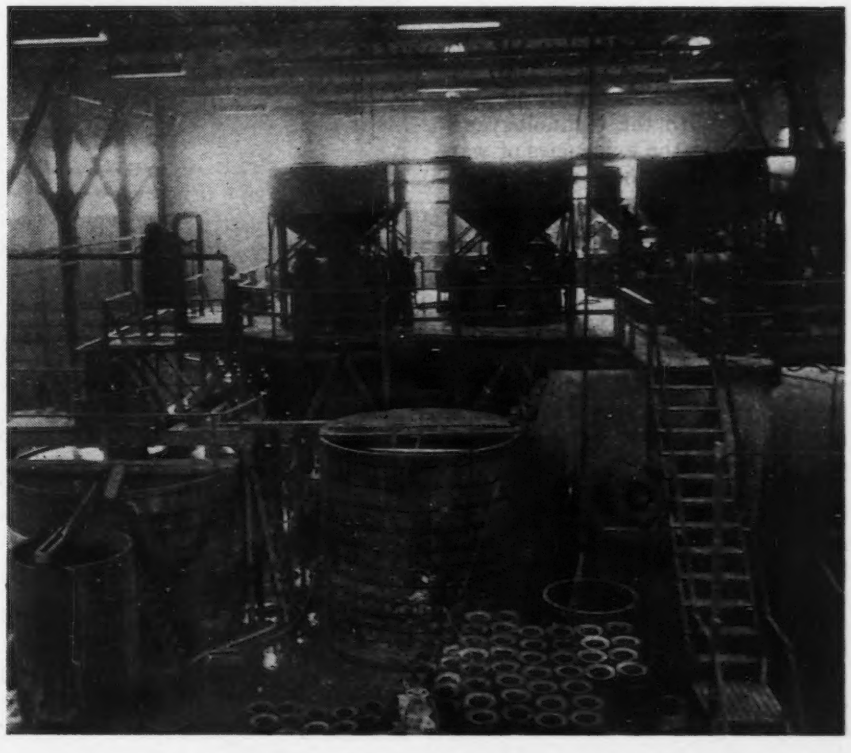
This unique tungsten plant, the existence of which has not been disclosed hitherto because it is engaged on war production 24 hours a day, has been supplied, thanks to Mr. Li, with large stocks of concentrates shipped from all parts of the world before the Axis could acquire them.

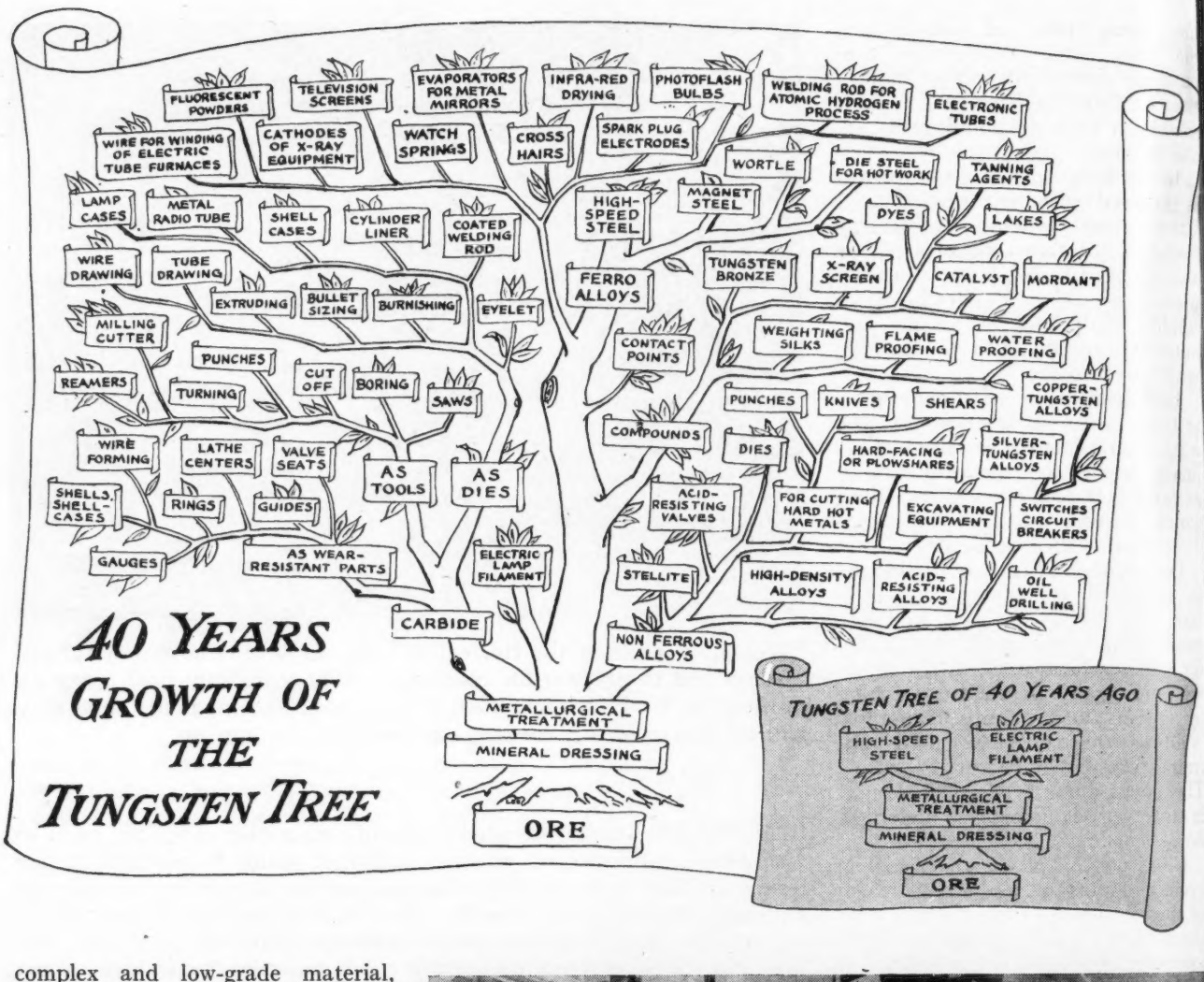
The plant has been of great benefit to tungsten consumers, making it unnecessary for them to install the equipment that would otherwise be needed for purifying the concentrates. Also, equipped as it is to concentrate and purify any type of



TWO ROASTERS, of the Herreshoff type, serve to remove sulphur and arsenic and to prepare for leaching. Where wolfram ores carry impurities too finely disseminated to be removed by magnetic separation without fine grinding, roasting and leaching are applied.

LEACHING is employed where strongly magnetic products, such as wolframite concentrates, contain sufficient value to warrant further treatment; also, to purify scheelite concentrates containing phosphorus, antimony, arsenic, and bismuth. For the acid-leaching of the former, two 8 x 8-ft. rubber-covered steel conditioner tanks are provided. For leaching scheelite there are eight 8 x 8-ft. tanks equipped with rubber impellers and acid-proof motors. The procedure in both cases is discussed further in the accompanying text.



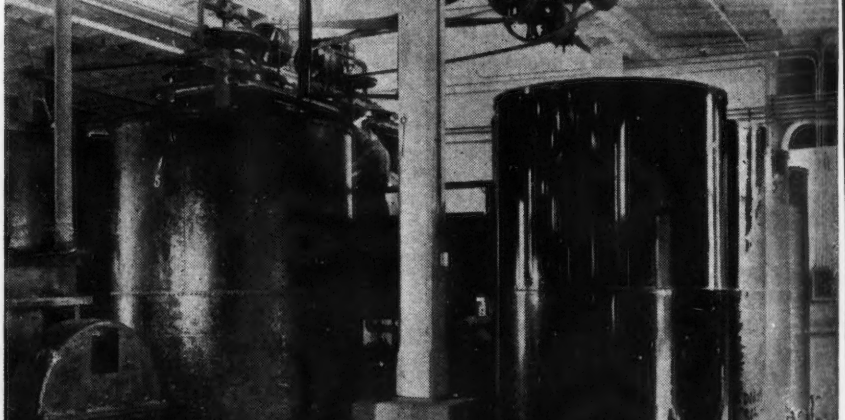


complex and low-grade material, regardless of impurities, it has enabled producers in all parts of the world to contribute to the war effort by providing them with a market.

Tungsten's Future

Mr. Li sees a bright future for tungsten. With the technology developed under the exigencies of war, he foresees many new uses for the metal. The accompanying "tungsten tree," prepared by his company, demonstrates the present uses and how they have multiplied.

"The tungsten industry is still in its infancy," he says. "Despite developments made during two world wars, it is a mistake, I think, to assume that tungsten is only a war material. The much talked-of fastest plane, which will take us from New York to Chungking in 14 hours, will require a large amount of tungsten alloy. The world is moving forward rapidly and is fast becoming one civilization. Such progress is dependent on swift transportation and swift transportation is dependent on engines, and high altitude flying, all of which will demand superquality tungsten."



A FUSION AND MELTING PLANT, seen here in part, is provided for processing all concentrates that do not respond to mechanical treatment, either because the impurities are in solid solution or disseminated. Here also are handled mixed dusts from the crushing and sizing and all treatment departments, baghouse dust from drying, roaster dust, and slimes from flotation. In the one plant facilities for sintering, smelting, and refining are provided. The operations yield various products, including sodium tungstate and synthetic scheelite.

For Fast Work in Locating a Knuckled Raise

N. D. McKECHNIE, *Halet, Quebec, Canada*

A SIMPLE, rapid method for locating the turning point and determining the change in bearing for a knuckled raise has been developed at Malartic Gold Fields, Ltd., Halet, Quebec, Canada. The method is applicable where limitations are as follows:

1. Coordinates and elevations of starting point and destination are fixed.
2. The slope of a line directly connecting the two points is greater than the allowable slope of the raise.
3. The raise must stay within the boundaries of an inclined formation.

Draw a horizontal projection showing the starting point, A, and the finishing point B'' in their true relative positions; and the traces of the formation at elevations of A and B'' respectively. From A draw a line, equal in length to the product of the difference in elevation and the cotangent of the allowable slope, to any point C'' within the trace of the formation at elevation B''. Join C'' and B''. On $C''B''$ construct an angle $DB''C''$ equal to angle $AC''B''$. Then E, the point of intersection of DB'' and AC'', is the horizontal projection of the turning point. The direction of AE is the original bearing, and of EB'', the final bearing of the raise. Since the slope of the raise and the coordinates of A and B'' are known, all slope distances and angles can be calculated.

Proof

By reference to the isometric projection the proof is indicated as follows:

It is required to prove that if the point E is the horizontal projection of the turning point, then angles ACB and EBC are equal.

Let A and B'' be the two known points. Let C'' be the point within the same formation as A and B'', and at the elevation of B'', such that angle $C''AC$ is the required slope of the raise. Let E' be the point on the line $C''A$ such that the slope of the line $E'B''$ is equal to that of AC''. Let the points C, B, and E be the horizontal projections of the points C'', B'', and E' at the elevation of A; and let the points C' and B' be the horizontal projections of C'' and B'' at the elevation of E'.

Then right triangle $CC''A$ is similar to right triangle $C'C''E'$ and

$$\text{angle } C''E'C' = \text{angle } C''AC$$

By construction

$$\text{angle } B''E'B' = \text{angle } C''AC$$

Therefore

$$\text{angle } B''E'B' = \text{angle } C''E'C'$$

Since C'' and B'' are at the same elevation by construction, and C' and B' are both at the elevation of E',

$$C''C' = B''B'$$

Therefore right triangle $C''C'E' =$ right triangle $B''B'E'$

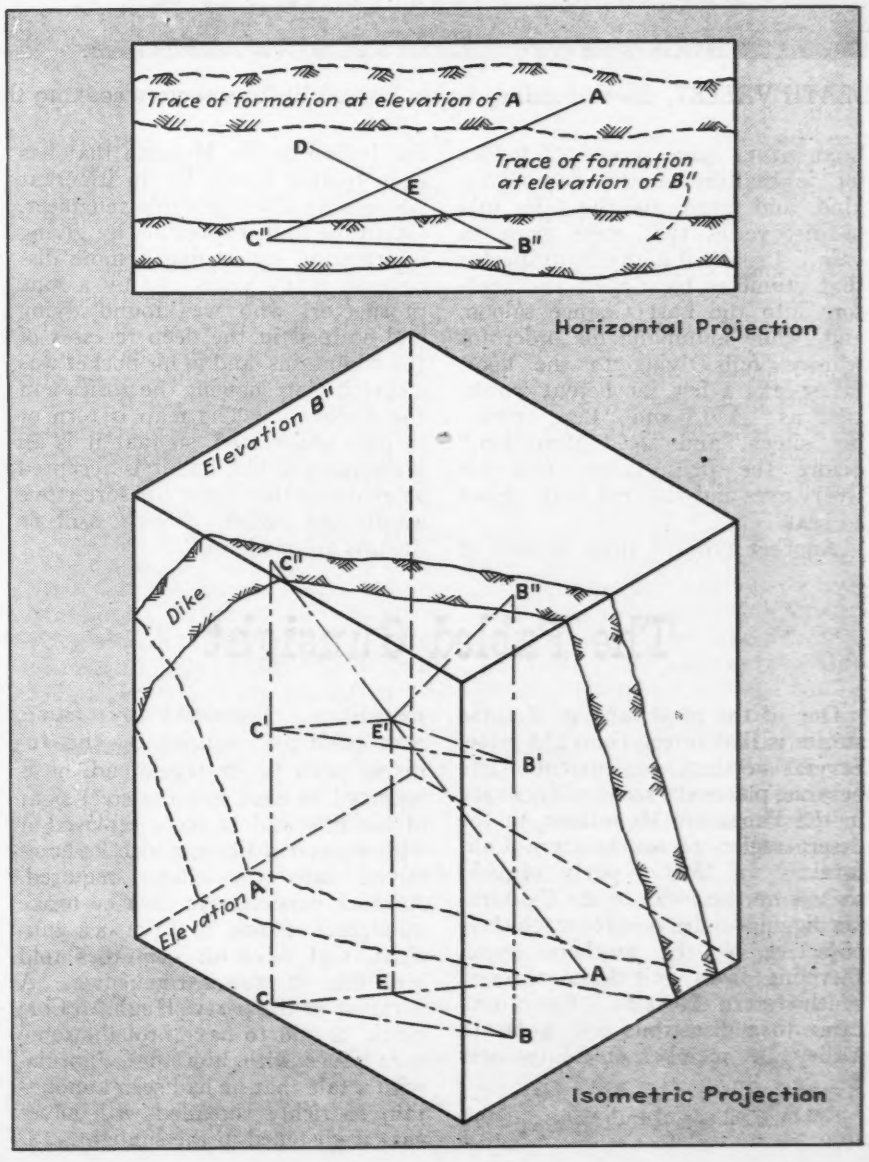
and

$$E'C' = E'B'$$

$$EC = EB$$

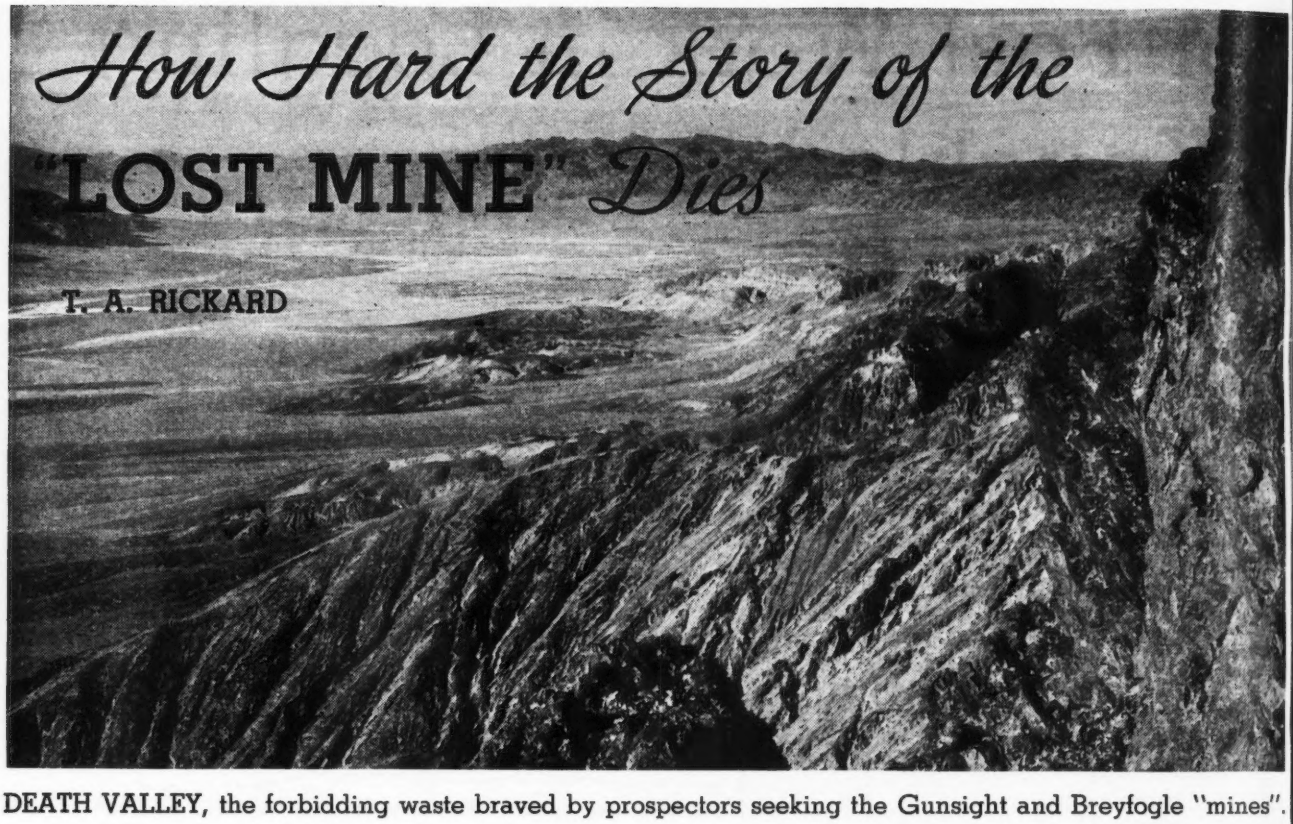
and in triangle ECB

$$\text{angle } ECB = \text{angle } EBC$$



How Hard the Story of the "LOST MINE" Dies

T. A. RICKARD



DEATH VALLEY, the forbidding waste braved by prospectors seeking the Gunsight and Breyfogle "mines".

LOST MINES have served as fodder for journalism of the flamboyant kind, and many are the tales told of discoveries that were made in vain. Usually it is an old prospector that stumbles blear-eyed and foot-sore into the Last Chance saloon, and, while mumbling his order for whisky, falls dying to the floor. He speaks a few incoherent words, such as "gold" and "Bear creek," or "silver" and "Red Mountain," before the light fades from his weary eyes and his tired heart ceases to beat.

Another type of story is that of the Indian or the Mexican that has been treated kindly by an itinerant surveyor or a roving mining engineer. Gratitude finds expression by giving information concerning a mine discovered many years ago by a lone prospector, who was found dying and scalped in the deep recesses of the mountains, and in his pocket was a sketch-map showing the position of the discovery. The map is torn or in part obliterated, so that it is an inadequate guide, but it is accepted as evidence that some treasure-trove awaits the finder. "Such stuff as dreams are made of."

The Fabled Gunsight

One of the most famous of these stories is that of the Gunsight mine. Several versions are current. The best one places the scene of discovery in the Panamint Mountains, in the desert region of southeastern California.[1] In 1849 a party of gold seekers on their way to the Californian diggings endeavored to reach their objective by the southern route, traveling from Salt Lake through southwestern Nevada. Their trek came to a disastrous end in Death Valley. A member of this pioneer expedition, Townsend by name, was killed and scalped by the Indians; prior to his tragic end, he is reported to have lost the steel sight of his rifle and to have replaced it with a piece of silver, which he hammered into the shape required. Another version says that he broke off a piece of rock, to serve as a gunsight, and later his comrades told him that it was native silver. A survivor of the party, Hugh McCormack, is said to have brought some wire silver with him to California, with a tale that he had seen a mountain so richly threaded with silver that it glistened in the sunlight.

In the old rifles the gunsight was fitted into a slot at the end of the barrel. To fix it in place the piece of rock would have to be whittled and hammered into shape, so that even if the silver was tarnished black when detached from the rock, it would show the white metal where cut or scratched. A gunsight made of native silver, which is soft, would be useless, because the least blow would bend it. As to McCormack's tale, the face of a mountain threaded with native silver would not glisten, because the silver would be black in consequence of oxidation. The terrible hardships that these eager 'forty-niners' underwent in the wilderness were such as to excuse them for harboring geological illusions.

A later variant[2] of the same story says that a member of the party "was coming down the west side of the Panamint range when he noticed that the front sight was missing from his gun. He recollected that a few miles back along the trail he had struck his gun against a boulder. He remembered that boulder and he hurried back to it. He found his sight on the ground close to the boulder, just where he expected to find it, and as he picked up the gunsight, he saw rich silver ore lying on the ground." This description is

[1] W. A. Chalfant, 'Death Valley,' p. 108; 1930.

[2] Bourke, Lee, 'Death Valley,' p. 126; 1930.

true to the type of lost-mine tale. The man we are told was an "emigrant" and therefore without much experience of any practical kind. How likely would he be to identify one boulder that he had passed "a few miles back?" He was in a desert country, traversed only by predatory Indians; would he leave his party and go back a few miles while presumably the rest of his party proceeded on their way? How would he recognize the richness of the silver ore? We are not told that it was native silver; even if it was, it would be so weathered as to be overlooked by a novice.

To give verisimilitude to an unconvincing yarn, we are told further that he examined the ore and was impressed by its high value. (How did he arrive at its value?) Before he saw the ore he had thought of nothing but escape from the desert. He had been saving his strength by following the washes and cuts through the hills, staying on the most natural trail through the low places. But when he found the ore, he forgot fear, thirst, and weariness and began to climb the hills. The emigrant knew that the ore he had picked up was only a bit of float washed down from the main orebody somewhere in the hills above him. He traced the float up the wash and searched the rock strata until he discovered the main lode. The quantity of rich ore in sight astonished him. He was glad he had thrown away everything he owned (including, we may suppose, his water-bottle, his gun, and his pipe) in his effort to escape from the desert. He was travelling light and was able to fill his pockets with ore specimens. The specimens got heavy before he reached Los Angeles, 200 miles distant, and he threw them away. But he was still astonished by the richness of the mine he had stumbled upon. He described the mine to everyone and explained that he had named it the Gunsight mine after the lost front sight which led him to its discovery. It would have been more in keeping with such tales if he had possessed the foresight to retain at least one sample of the fabulous ore. Half a pound of it would have been no great burden and it might have been regarded as evidence of his find.

After the discovery of the Comstock, in 1859, the search for silver became widespread, and the story of the Gunsight mine, now an established tradition, drew many prospectors into the desert lands and forbidding ranges of southeastern California, close to the border of Nevada, and far from any base of supplies. The nearest towns were Bakersfield and San Bernardino, each about 160 miles distant from this corner of the arid wilderness. Nevertheless the undaunted gold-seekers penetrated the desolation and sought the fabulous ore. Many of them died of thirst, after pitiful deception by the tremulous mirages of the desert; some were attacked by the Indians, to whom the country belonged; others lost their way in the sombre fastnesses of the Coso and Panamint ranges. A patch of rich ore on the side of Telescope Peak and another in an *arroyo* that cleft the same mountain were heralded as the Gunsight treasure, but these finds and others proved too inconsequential to fulfill the tradition.[3] The Gunsight mine remains undiscovered; it was obviously a creature of the imagination.

[3] Neill C. Wilson, 'Silver Stampede,' pp. 6, 12, and 18; 1937.

The Breyfogle Mine

Another lost mine, in the same arid and inhospitable region of Death Valley, the Funeral Mountains, and other ominous natural obstacles, was the Breyfogle.[4] In 1864 Jacob Breyfogle and two others started from Los Angeles to go to Austin, in central Nevada. The distance is four hundred miles and they laid their course straight across the wilderness. Traversing the Mohave desert and threading the Inyo ranges, they then climbed the Panamint Mountains and looked on Death Valley. The name proved portentous. While they lay asleep a band of hostile Indians surprised them. Breyfogle was lying apart from his companions; he heard their appalling yells as the tomahawks of the savages cleft their skulls. Having no time to dress, he ran with his boots in his hands, and stumbling, tottering, in mortal fear, he managed to escape during the night. Before dawn he was in the valley and at the spot where water had been obtained the day before, a place known now as Daylight Spring. He filled his boots with water and continued on blistering feet to walk across Death Valley in the hope of reaching the foot of the Black Range. Eventually he traversed the Amargosa desert and came to Smoky Valley, where a kindly ranchman befriended him. By this time he was nearly bereft of his mind, his feet were bleeding, his clothes were in tatters, he was famished—it was the mere wreck of a man that the ranchman saw. In his hand, Breyfogle carried a bandana that was wrapped around a number of pieces of quartz so rich in gold as to be more gold than quartz. The "crazy Dutchman" told the ranchman that he had found the richest mine in the world. It may have been, for it has never been found.

A second story says that Breyfogle was familiar with the desert country of the southwestern United States, and for this reason he was engaged to act as guide to a party of Southerners that wanted to go from Austin, Nevada, to Yuma, Arizona. The party set forth, and nothing more was heard of it until Breyfogle was carried into town more dead than alive. He had been found battered and delirious at Stonewall Springs. Apparently he had been attacked savagely. In his pockets or haversack were found a number of "specimens of very rich gold quartz." The question arose, who had beaten him, and why? And whence came the wonderful ore? Breyfogle could say nothing for many days, and when he recovered his reason it was only to find that his memory failed him. He remembered Daylight Spring, in Death Valley, and he thought he had stumbled upon the mine, that is, the golden quartz, before he reached the spring. He believed that he could see the place from there. That was the only clue. He himself went, with others, to retrace his steps, but he could not find the lost mine. In 1906, we are told, "Bill Corcoran went up to Daylight Spring and looked northeast through the notch in the pass, and there across the Amargosa desert were the claims of the Bullfrog Mining Company and the National Bank mine, streaks of dirty-brown quartz across the face of Ladd Mountain." So says Mr. Bourke Lee.[5] In short, one of these two mines was supposed to mark the place of the Breyfogle discovery. Bullfrog was a mining centre that enjoyed a brief boom. It would have been better—for the public—if the lost mine of Breyfogle had never been found, if indeed it really was found, a matter still much in doubt.

The pieces of ore that Breyfogle brought with him are said to have

[4] Dane Coolidge, 'Death Valley Prospectors,' p. 61; 1937.

[5] Bourke Lee, *op. cit.*, p. 12.

been reddish quartz. Nearly forty years later, one of his samples, left at Austin, was compared with the ore of the Jumbo vein, at Goldfield, and found to be similar in appearance. There is no sufficient reason to accept this identification; reddish gold-bearing quartz is not unique. The Breyfogle mine has joined the mirages of Death Valley.

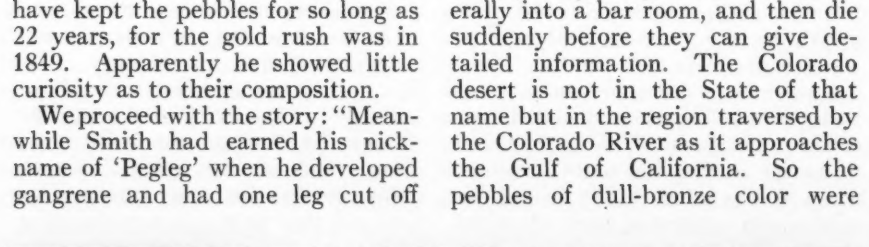
Pegleg Smith's Mine

The story of the mine that Pegleg Smith found and lost has been re-told recently with a few added frills. "In 1827 Thomas L. (Pegleg) Smith, a horse-trader, was going to Los Angeles across the moving sand dunes west of Yuma, Arizona, when he took a short cut and got lost. He climbed a hill, the highest of a group of three. The entire top of this hill was covered with masses of pebbles of a peculiar dull-bronze color. He brought some of them to Yerba Buena, as San Francisco was then called, and years later, when the gold rush developed, the pebbles were identified as almost solid gold and subsequently assayed at $2000 a ton." So says Mr. Glenn Quiett.[6] If the pebbles were almost solid gold they would be worth from $400,000 to $500,000 per ton at the then prevailing price of gold. Pure gold, at the old price of $20.67 per ounce, was worth $602,886 per ton. It is curious that Mr. Smith should have kept the pebbles for so long as 22 years, for the gold rush was in 1849. Apparently he showed little curiosity as to their composition.

We proceed with the story: "Meanwhile Smith had earned his nickname of 'Pegleg' when he developed gangrene and had one leg cut off with a saw by an amateur frontier surgeon." However, Mr. Smith's crippled condition did not prevent him from going afield. "In 1830 Pegleg got financial backing to return to the desert." Evidently, therefore, he did not wait until the gold rush of 1849, but had the assay made in 1830, only three years after his remarkable discovery. In 1830 there was no assayer at Yerba Buena. "He hired Indians to help him and made many trips; but he could never find his lost mine, and he died, disappointed and well soaked in rum, in San Francisco in 1866." So he was spared for 39 years, during which lengthy period he might have sought for his treasure-trove. Nevertheless it escaped his search, and continued to be an alluring myth.

"In 1884 a prospector who had crossed the Colorado Desert from Yuma staggered into Los Angeles and fell violently ill. In his hotel he called for a doctor, and before he died he gave him a bag containing $5000 in nuggets of rusty gold. 'Take the mine,' he said; 'she's yours. It's the lost Pegleg, 30 miles from Smith Mountain, southeast of Warner's Pass above the Butterfield Trail.'" Here we have the real touch, the finders of lost mines usually stagger upon the stage, generally into a bar room, and then die suddenly before they can give detailed information. The Colorado desert is not in the State of that name but in the region traversed by the Colorado River as it approaches the Gulf of California. So the pebbles of dull-bronze color were "nuggets of rusty gold." Gold does not rust, or tarnish; it is immune to oxidation and therefore retains its bright lustre, which is the reason it has been valued for ornamental purposes ever since the dawn of human endeavor and it is also the reason why it has been deemed particularly suitable for the purpose of coinage in later, more civilized days. Nuggets of gold are unlikely to be found on top of a hill, where Smith is said to have found these remarkable pebbles. Usually nuggets, being rounded and water-worn lumps of metal, are found in a river-bed or some other alluvial channel. However, these considerations were not present in the minds of the men that heard the story and forthwith went in search of the treasure.

"Dr. James De Courcey told Thomas W. Cover, of Riverside, who went with a companion, W. B. Russell, to search for the lost mine. They explored the desert country west of Indio, a district much of which is below sea-level and surrounded by mountains. In a labyrinth of gullies and dry washes called the Bad Lands they parted company, Cover to investigate the country, Russell to continue on with the buckboard wagon. They were to meet at an appointed place, but Cover never returned and his bones were later found on the desert." The mention of three names, with initials, should give a touch of reality to this part of the yarn. The arid district described as labyrinthine is east, not west, of Indio. If the two men drove through it in a wagon, it could not have been wholly inaccessible. It is remarkable that one of them returned, whereas the other left his bones in the wilderness.



"Take the mine," he said;" she's yours."

A Generous Squaw

"During the eighties a station agent of the Southern Pacific at Flowing Wells, California, got a present of a piece of this same rusty gold in a handkerchief. It was given him by an Indian squaw, who pointed to Smith Mountain and disappeared. All the section crew deserted to search for the lost Pegleg mine, but they eventually had to return to the prosaic work of track-repairing. Through the years hundreds of prospectors have searched for the lost Pegleg, but no deposit producing that strange rusty gold has ever been found." Nor is it likely to be found. "Rusty gold" strikes a false note. This last version of the tale is no better than the others. Why did the squaw give the railroad agent a piece of rusty gold, and what had she to do with handkerchiefs? If a Sherlock Holmes were put to work to solve this prospector's riddle, he would, I think, accept the clue of Smith Mountain. If that was named after Mr. Smith, as seems likely, then obviously somewhere on the summit is the place to seek for gold, if you desire healthful exercise.

[6] Glenn C. Quiett, 'Pay Dirt,' p. 13; 1936.

Cable Tools and Reamer Sink 48-in. Diameter Shaft

EDWARD J. ROGERS, *President and General Manager, Layne-Northwest Co., Milwaukee, Wis.*

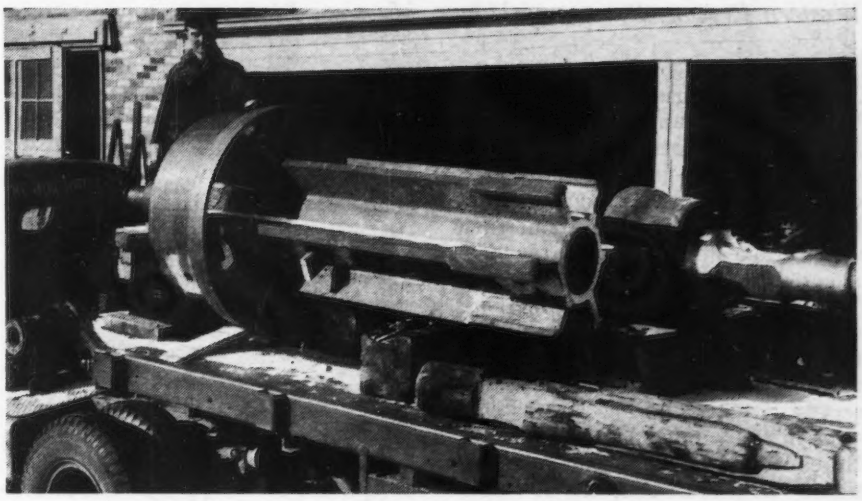
WE NORMALLY think of air shafts as being constructed by sinking or by raising or both, not by boring or by cable-tool drilling. Of necessity they must be of relatively large cross-sectional area to be able to conduct the required volume of air to the lower levels. Recent development of new equipment now permits the drilling of holes of comparatively large diameter, for ventilation or other service.

Two commonly known methods—the cable-tool and the rotary—are used in drilling. Rotary methods employing shot, otherwise known as shot-drilling, have been used with good results and have drilled holes of fairly large diameter.

Cable-tool drill holes until recently have been limited to diameters that were small in comparison with the depth of the shafts required, for example, on the Menominee, Marquette, and Gogebic ranges in northern Michigan. In 1942, Inland Steel Co. decided that in operating its new Sherwood iron mine, at Iron River, Mich., on the Menominee Range, it would require another opening for underground ventilation and in the shortest possible time. R. L. Wahl is general superintendent for Inland and R. D. Satterley is Menominee Range superintendent. An inspection of the ventilation shaft of the Hiawatha was made.

The Hiawatha shaft had been drilled by a cable-tool machine employing a reamer, developed and patented by the contractor, Layne-Northwest Co., of Milwaukee, Wis. It was cased to ledge about 60 ft. below surface and a 30-in. diameter hole drilled to 1,077 ft., intercepting the ninth level.

The formation of the Hiawatha lies at various angles off the horizontal plane. This had increased the difficulty of the problem of drilling a large and straight hole. The breakage of tools and other problems attendant upon the drilling of a 30-in. hole that would be experienced under fair conditions were sufficient to discourage if not prohibit it. As a result a reamer was developed for drilling the Hiawatha hole, which proved successful.



Unusual built-up cutting edges are shown in this 2,000-lb. 30x48-in. reamer assembly. Top of 12x30-in. reamer shown in background.

The 30-in. casing driven to the top of the ledge had been encased in grout. Beginning at the bottom, a 12-in. diameter hole was drilled to 1,077 ft. Next the reamer was used. This was constructed with a guide which followed the 12-in. hole, and with one operation it reamed the hole to 30 in. in diameter. It was not particularly difficult to keep the 12-in. hole straight, and of necessity the 30-in. hole followed the exact course of the 12-in. hole. The attendant shock on the tools was much less, thereby reducing breakage. The equipment weighed a great deal, however, and had to be of substantial construction and heavily powered. Cuttings from the reamed hole were removed at the ninth level.

After due consideration, the contractor undertook to drill a 48-in. diameter hole at the Sherwood mine. The formation was similar, but the ledge was deeper. A hole was dug to ledge, which was found at 132½ ft., and a steel casing 48-in. in diameter was installed and encased in cement. A 12-in. hole was then drilled to a depth of 1,005 ft.. Using the patented reamer developed for the shaft at the Hiawatha mine, the hole was first reamed to 30 in. in diameter, with the guide following the 12-in. hole and the reamer enlarging the hole to 30 in.

The 48-in. reamer next used presented a very different problem, and the construction ultimately employed was more or less a radical departure from that of the 30-in. reamer. One limitation was the amount of power available and, at best, the tremendous weight of the reamer. The guide had to be 30 in. in diameter and long, to be effective. The reamer body needed to be heavy and strong to withstand the tremendous shock, since much of the formation was very hard. In its final form it weighed nearly 9,000 lb. and was made of the best materials available under wartime restrictions. All tool joints were eliminated and a unique jar, incorporated within the reamer itself, replaced the ordinary set of drill jars. All cutting edges were built up with welding rod on the job.

The hole was reamed to 48 in. to a depth of 487 ft., at which point repairs were required. Due to the relatively long time required for delivery and the necessity for ventilation underground, the shaft was placed in operation immediately after completion.

Hand Auger Rapid, Cheap to 140-Ft. Depth in Clay

S. H. LORAIN, *District Engineer, and* **MIRO MIHELICH,** *Associate Mining Engineer, Western Region, Bureau of Mines, Moscow, Idaho*

ALTHOUGH the use of ordinary post-hole augers for sampling shallow tailings dumps and other unconsolidated deposits of fine-grained material is common practice, nothing so far as known has been written about their application in sampling large tonnages to depths of 100 ft. or more. This discussion therefore of methods and costs involved in drilling 15,000 ft. of hole in sampling some large alumina-clay deposits in Idaho deserves attention. The work was done in 1942 and 1943 as part of the Bureau of Mines' program to investigate domestic sources of high-alumina clay.

The principal deposits sampled occur in nearly horizontal beds resting upon basalt flows, and occupy the summits of low, rounded hills. Erosion has reduced the surface to gently rolling land forms covered by 15 to 30 ft. of loess. The clay was derived from the weathering of granitic intrusives and deposited in nearby lake beds. It has a fine-grained texture and is so plastic before drying that it can be molded readily. Successive layers, from a few inches to 10 ft. or more in thickness, vary slightly in composition and color. These layers do not retain their identity for appreciable horizontal distances. Occasional thin seams of limonitic or manganiferous sands are interstratified with the clay.

When deposited, the beds in which most of the drilling was done were probably 150 ft. thick. Much of this material has been removed by erosion, the original thickness being approximated only on the hilltops. The average remaining thickness of clay is 26 ft. and that of the average loess covering 15 ft. In the largest deposit drilled there is more than 60,000,000 tons of clay averaging 24 to 26 percent Al_2O_3, 5 to 9 percent Fe_2O_3, and 45 to 50 percent SiO_2.

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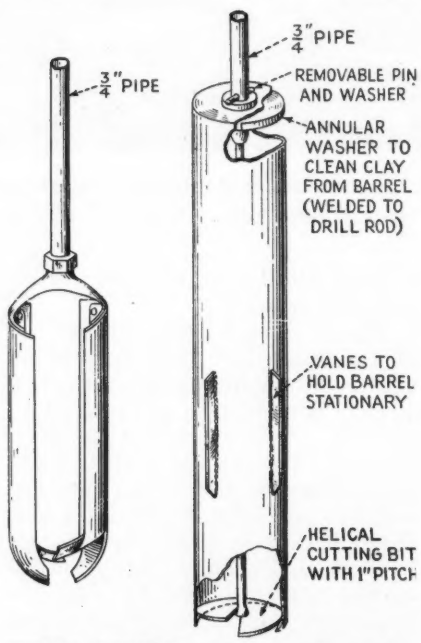
The surface is chiefly farm land with second-growth timber and brush around the margins.

Laying Out the Holes

Drilling progressed in three stages. The first was the drilling of irregularly spaced pioneer holes to determine the most favorable general areas. This was continued throughout the program to find additional deposits suitable for more thorough exploration later. Second, a square-grid pattern was drilled on 1,000-ft. centers. The third and final step was to drill the same patterns on 500-ft. centers. Results of the 1,000-ft. and 500-ft. drilling were found to check so closely that additional drilling was not necessary.


¾" PIPE
¾" PIPE
REMOVABLE PIN AND WASHER
ANNULAR WASHER TO CLEAN CLAY FROM BARREL (WELDED TO DRILL ROD)
VANES TO HOLD BARREL STATIONARY
HELICAL CUTTING BIT WITH 1" PITCH

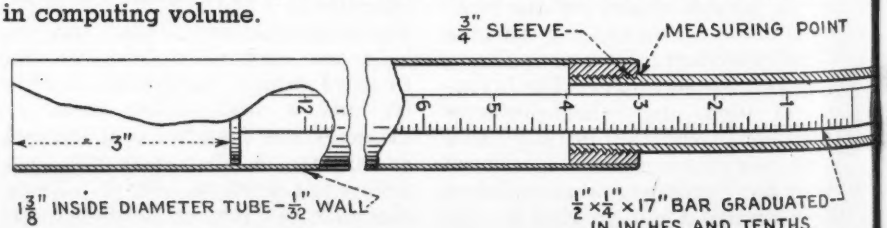
IWAN AUGER, 3 in. in diameter (seen at left) was used in all the drilling described. A drill with a longer core barrel (right) was devised but proved unsatisfactory in overburden or sandy clay.

In all, 14,928 ft., comprising 360 holes, was drilled. The average length of hole was approximately 41.5 ft. Of this amount 12,147 ft. in 268 holes was drilled on the main grid, the remainder in exploration work. The deepest hole was 142.4 ft. deep; 6 holes were over 120 ft. deep; 15 were 100 ft. or more; and 34 were over 80 ft. deep.

All drilling was done with 3-in. "Iwan" augers. This type was found to drill satisfactorily and to give a better core recovery than other augers. A bit drilled approximately 155 ft. before wearing out. Five-foot lengths of ordinary ¾-in. steel pipe were used to increase rod length as required.

The only other drilling equipment normally required was a pair of Stillson wrenches for connecting and disconnecting drill rods; they also served as hand holds when raising and lowering the rods. Pipe tongs were used for holding the weight of suspended rods while breaking or connecting. A small tripod of 2x4-in. lumber with an ordinary rope block and tackle was employed in

SPECIFIC GRAVITY SAMPLES were taken with this tube. It is driven about 3 in. into the clay. Allowance is made for thickness of tube wall in computing volume.



DIRECT BORING AND SAMPLING COST—137-FOOT HOLE*

Boring @ $0.76 / Man-Hr. Sampling @ $0.825 / Man-Hr.

Interval	Boring and Sampling Time, Hr.	Distance Drilled, Ft.	Adv. per Hr., Ft.	Man-Hr. Boring per Ft.	Cost Boring per Ft.	Man-Hr. Sampling per Ft.	Cost Sampling per Ft.	Total Man-Hr. per Ft.	Total Cost per Ft.
0.0–18.0	4.0	18.0	4.50	0.555	$0.422	0.111	$0.0916	0.67	$0.516
18.0–32.0	3.0	14.0	4.66	0.536	0.407	0.107	0.088	0.63	0.496
32.0–50.0	7.0	18.0	2.58	0.969	0.736	0.16	0.133	1.129	0.869
50.0–65.0	7.0	15.0	2.14	1.172	0.888	0.233	0.193	1.405	1.083
65.0–75.0	7.0	10.0	1.43	1.748	1.328	0.349	0.288	2.097	1.617
75.0–84.8	7.0	9.8	1.40	1.786	1.357	0.357	0.294	2.143	1.651
84.8–94.8	7.0	10.0	1.43	1.748	1.328	0.349	0.288	2.097	1.617
94.8–104.8	7.0	10.0	1.43	1.748	1.328	0.349	0.288	2.097	1.617
104.8–112.7	7.0	7.9	1.13	2.212	1.681	0.442	0.365	2.654	2.046
112.7–122.2	7.0	9.5	1.35	1.838	1.397	0.368	0.306	2.206	1.703
122.2–129.0	4.0	6.8	1.70	1.470	1.117	0.294	0.243	1.764	1.360
129.0–132.3	6.5	3.3	0.508	4.921	3.740	0.984	0.812	5.905	4.552
132.3–134.9	6.0	2.6	0.433	5.773	4.387	1.131	0.952	6.904	5.339
134.9–135.6	2.0	0.7	0.350	7.143	5.429	1.428	1.170	8.571	6.599
135.6–136.9	3.5	1.3	0.371	6.738	5.121	1.347	1.112	8.085	6.233
Totals and averages	85.00	136.9	1.61	1.56	$1.18	0.31	$0.256	1.87	$1.436

* This hole drilled during inclement weather. Five feet of snow and the formation of ice on rods and wrenches decreased the drilling rate.

raising and lowering rods in holes more than 100 ft. deep.

A "chopping" bit, consisting of a 2-in. axle forged into a wedge bit, was used in going through cemented gravel.

Usually a drill crew consisted of two drillers and a sampler. As a rule, two to three crews were worked simultaneously. One general foreman supervised operations, and one man was constantly in the sample shed, drying, quartering, and sacking samples. One or two surveying parties, each consisting of an instrument man and a helper, were required to spot holes and obtain collar elevations in the large areas. Two or more brush cutters were employed part time. One engineer handled general supervision and administration.

For these crews, a particularly high class of labor was available. Most of the men were over 45, many of them 55 or more, being mostly Scandinavians of the independent small-farmer class. Many owned land in the area being drilled. Probably with ordinary labor the cost in man-hours would be higher.

Drilling Procedure

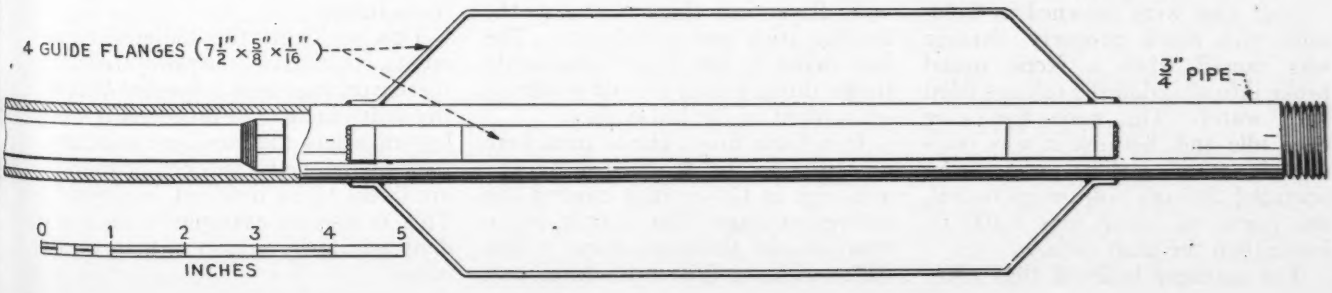
After each advance of 4 in. the drill was lifted and the core dumped on canvas, this being the amount of clay the bit or "core barrel" contained when filled. A drill with a longer core barrel was devised. This eliminated side friction and was satisfactory in plastic clay, especially in deep holes. However, it was not satisfactory in overburden or sandy clay. The time saved by its use in shallow holes was negligible. Because of the difficulty of obtaining suitable materials for its construction in wartime, it was never perfected, nor was it used beyond the preliminary trial period.

The drilling or "twisting" operation was handled easily by the two drillers at depths to 100 ft. For those greater than this, the sampler assisted with a long-handled Stillson. The sampler also helped at all depths in pulling and lowering the drill rods. His chief function here was to steady the rods.

The entire clay-bearing section of the drill core was saved and sacked on the drill site. At each change in character of material, the sample was cut and the footage and type were recorded. While drilling in uniform material, samples were taken at intervals of 5 ft. These were hauled to the shed, where they were spread on shallow wooden trays, 5 by 1 ft. by 1 in., and placed in a rack to dry. This rack was inclosed in a small room heated by an oil stove to 130 deg. F. The samples took 50 hours to dry sufficiently to be crushed easily. They were then reduced to minus $\frac{1}{4}$ in. in a laboratory crusher. Samples were cut with a Jones riffle, 3 lb. being taken from each interval sample for immediate analysis. When the hole was finished, a weighted composite was prepared for the entire thickness of clay cut. Upon completion of the area, a weighted area sample was prepared, and all rejects were saved for large-scale metallurgical tests.

Grab moisture samples were taken every 5 ft. An entire auger full of clay was placed in a wide-mouth quart mason jar and the jar sealed. The jars were sent to the laboratory for moisture determination.

Specific-gravity samples were



DIRECT LABOR COST IN MAN-HOURS ALSO, ACTUAL DRILLING TIME, ALL HOLES

Holes by 10-Ft. Intervals to 70-Ft. Depth

Interval	Boring and Sampling Time, Hr.	Distance Drilled, Ft.	Adv., Ft. per Hr.	Man-Hr. Boring per Ft.	Man-Hr. Sampling per Ft.	Total Man-Hr. per Ft.
0.0–10.0	1.13	10.0	8.88	0.281	0.056	0.331
10.0–20.0	1.47	10.0	6.76	0.369	0.074	0.443
20.0–30.0	1.61	10.0	6.23	0.401	0.080	0.481
30.0–40.0	1.63	10.0	6.15	0.406	0.081	0.487
40.0–50.0	1.71	10.0	5.84	0.428	0.085	0.498
50.0–60.0	2.45	10.0	4.08	0.612	0.122	0.734
60.0–70.0	2.97	10.0	3.36	0.744	0.148	0.892
Totals and averages	12.97	70.0	5.90	0.424	0.085	0.509

taken frequently in a specially designed tube. Inasmuch as the clay is exposed nowhere in a solid face, the problem of obtaining a reliable figure for weight in place was difficult. However, the method adopted should afford a close approximation. The thin tube is lowered carefully to the bottom of the hole at the point to be sampled. A quick push or a few light taps drive it 3 in. into the clay. It is then withdrawn, the volume of clay accurately measured and weighed, and the specific gravity computed. It is assumed that the clay in the tube will be compressed by an amount equal to the volume of the tube wall, and allowance is made for this compression. The method should be accurate in proportion to the number of determinations made. The specific gravity was found to range from 1.8 to 2.6, depending on the type of clay.

In the accompanying tables the cost of drilling by the methods described is summarized.

AVERAGE COST ALL HOLES

	Dollars/Ft.
Labor	
Drilling	$0.581
Sampling:	
Field	0.230
Drying and shipping	0.130
Surveying	0.215
	$1.156
Rents (office and sample drying)	$0.020
Material	
Stove oil	$0.006
Other supplies	0.009
Bits	0.010
	$0.025
Transportation	$0.010
Supervision	0.200
Total cost per foot	$1.411

Conclusions

The work has demonstrated that hand-auger drilling is rapid and cheap for large-scale drilling and sampling of rock-free deposits of soil or clay where hole depths do not exceed 130 to 140 ft. and average less than 100 ft. Cost of equipment and materials is negligible. Labor cost for drilling is 0.3 to 1.0 man-hour per foot, with a gradual increase up to hole depths of approximately 50 ft. From 50 to about 130 ft. the labor cost per foot ranged from 0.5 to 2.00 man-hours, with a moderately sharp increase per foot of additional depth. For holes deeper than 130 ft. the cost rises so rapidly as to render any large amount of drilling at these depths uneconomical.

Under suitable conditions, the method has two outstanding advantages over any form of mechanical drilling. These are: low cost of equipment, and flexibility. When large numbers of relatively short holes distributed over a large area are drilled, the latter item is particularly important because of the ease and quickness of moving between set-ups. If the ground is uneven, timbered, or muddy, the relative economy of hand drilling becomes even more pronounced.

Old Mine Workings Present Hazards

MANY SERIOUS ACCIDENTS result from breaking into old workings which should have been known to be close by. Unsuspected hazards of water, mud, or air deficient in oxygen are often thus encountered. The Bureau of Mines has recently brought this subject to the attention of the mining industry in a warning bulletin, I.C. 7288. To illustrate, instances of such happenings are cited.

Four men were drowned in Colorado and much property damage was caused when a stope round broke into abandoned workings filled with water. The mine had long been idle and, because it was inaccessible from surface, was being operated through a drainage tunnel, the portal of which was 1,400 ft. lower than the shaft collar.

The manager believed that there was no water in the abandoned workings, although considerable had been found in the stope where the men had been working. The mine inspector said he had ordered the miners not to blast if water was flowing from holes too rapidly, and to carry a pilot hole ahead. A former workman stated that dynamite would not stay in some of the drill holes unless wooden wedges were driven into them as soon as the loading stick was withdrawn. The last round in the stope presumably broke through into the old workings on account of the heavy flow.

In a Utah mine, fifteen men were overcome by air deficient in oxygen and high in CO_2, which entered the active workings when a drift broke into an old timbered stope. This drift was being driven to intersect an abandoned stope which the mine map indicated to be about 60 ft. from the face of the drift. A driller thought that his drill had entered the old stope the night before the accident, but the round was shot and the place was not inspected though the foreman was notified that a drill probably had entered the old stope. They were brought out by a helmet crew and all but one were resuscitated.

This accident, the bulletin comments, could have been prevented had these workings been inspected before the shift entered. Further, it is well known where this accident occurred that abandoned timbered workings are likely to be deficient in oxygen. This is also an example of an accident arising by reason of inaccurate maps.

Sillimanite Find in South Proves Important

W. C. HUDSON, *Mining Engineer, U. S. Bureau of Mines*

AN EXCELLENT OPPORTUNITY to create a new industry in South Carolina and Georgia is presented in the recent discovery by the Bureau of Mines of large bodies of schist that contain economically recoverable crystals of high-quality sillimanite (Al_2SiO_5). The Bureau investigated possible sources of this mineral in South Carolina following an article in the *Engineering and Mining Journal* by L. L. Smith of the University of South Carolina stating that it had been identified in two places in Greenville County.

Sillimanite is an aluminum silicate mineral, similar to kyanite and andalusite. Kyanite and andalusite are used extensively in the manufacture of spark plugs and other highly refractory porcelains. At the same cost as kyanite, sillimanite would be chosen for most uses, but heretofore the lack of adequate sources of it has caused economic preference to be given to kyanite for special refractories and to andalusite for high-grade porcelains.

Twenty bodies of sillimanite schist, all nearly parallel, extend in conformity with the northeasterly trend of the Piedmont Plateau from near Talbottom, Ga., to the neighborhood of Spartanburg, S. C. They comprise a belt 30 miles wide and 250 miles long. The individual bodies range in width from a few feet to 200 ft. More than 150 exposures, nearly all on road banks, have been mapped by the author. The deposit that to date shows the most uniform content of sillimanite lies about 2 miles east of Pelzer and Greer, in South Carolina. It has an average width of about 200 ft. and is known to have a length of at least 40 miles.

The schist formations dip southeasterly between walls of gneiss or granite. Surface exposures vary in character from residual clay strewn with some float to rock that is fairly firm across part or all of the width. The color is usually reddish brown.

A sample of the partly weathered schist near Pelzer was sent to the mineral dressing laboratories of the Bureau of Mines at College Park, Maryland. Petrographic analysis showed the content to be 19 percent sillimanite, 50 percent mica, 25 percent quartz, 4 percent garnet, ilmenite, and hematite, and 2 percent of all other minerals. Microscopic examination indicated that the sillimanite crystals are almost entirely unlocked when the material is ground to pass 42-mesh screen. Beneficiation tests that involved gravity concentration and flotation yielded a sillimanite concentrate suitable as raw material for the production of high-grade porcelain. The mineral dressing process included tabling to reject most of the mica, followed by flotation of the table product to recover a high-grade sillimanite concentrate. An over-all recovery of 88.3 percent of the total sillimanite was obtained in a concentrate that contained 98 percent sillimanite and less than 1 percent iron oxide.

The Bureau of Mines is continuing exploration of the deposits. Economic extraction of the sillimanite is assured; the reserves exceed any conceivable industrial demand for years to come; operating conditions, transportation facilities, and availability of supplies, are favorable; so that with the establishment of a market for high-grade sillimanite concentrate the opportunity seems excellent to organize a new industry to supply a raw product for high-grade porcelain refractories.

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New Hampshire Sillimanite Studied

SILLIMANITE occurs in the Monadnock region of southwestern New Hampshire in considerable quantities in the schists of the Littleton formation of Devonian age, according to a paper by Katherine Fowler-Billings just issued by the New Hampshire Planning and Development Commission at Concord. It is scattered along a 10-mile belt, some occurrences showing enough of it to be considered of economic value. Three miles southwest of Mt. Monadnock is the Gap Mountain occurrence, a high-grade deposit 350 ft. long and 120 ft. wide. Here the sillimanite content ranges up to 20 percent. The mineral is in crystals 1 to 2 in. long which under the microscope are seen to be peppered with magnetite and biotite (about 1 percent). If these impurities could be removed in milling, the deposit could be regarded as of economic importance.

Another occurrence is the Cobb Hill deposit, 1½ miles northeast of Harrisville. This is 50–75 ft. wide, 450 ft. long, and of undetermined depth. The crystals average ¾ in. in length and ¼ in. in width and are made up of bundles of small, pure sillimanite needles, with relatively few impurities. This deposit also carries up to 20 percent of sillimanite. It is purer than that at Gap Mountain and seems to have economic possibilities.

Sillimanite appears to occur in varying amounts throughout the whole mass of Mt. Monadnock. In most places it has become altered to muscovite. Along the eastern ridge there is a considerable amount of crystals which are quite pure and 3 in. in length, constituting 20 percent of the schist locally.

There are other occurrences also of the mineral along Pumpelly Ridge and on Beech Hill. These however appear to be uneconomic by reason of their grade and the percent of impurities.

Bright Future Planned for Pacific Northwest

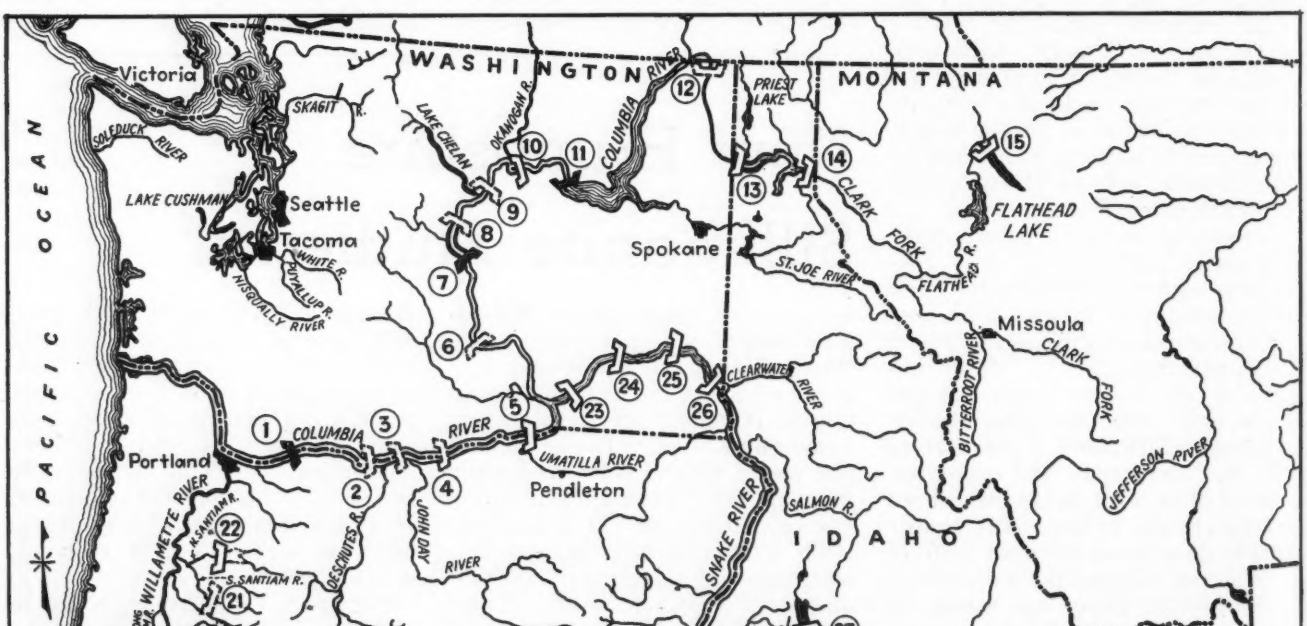
Bonneville Power Administration has comprehensive scheme, based on power, irrigation, natural resources, and population growth.

A GRANDIOSE PROGRAM for development of the Pacific Northwest, with hydroelectric power and natural resources of the region as the foundation, has been published by the Bonneville Power Administration, Department of the Interior. In brief, the program is similar to that being followed by the Tennessee Valley Authority. It contemplates a total of 29 dams in the Columbia watershed. The first 12 of these would have a capacity of about 1,500,000 kw., in addition to those now completed or under construction at Bonneville, Grand Coulee and Rock Island, Wash., Fern Ridge and Cottage Grove, Ore., and Anderson Ranch, Ida., which have a capacity of 2,558,000 kw. In addition the 12 dams are expected to provide for irrigation of 50,000 new farms, now dry land, for flood control, and for navigation on the Columbia as far up as the lower Snake River. Cost of six of the proposed 12 dams is estimated at $226,000,000.

A prime objective of the program is to free the Northwest from its present "colonial" status by increasing its population (by some 2,000,000), manufacturing facilities, and general self-sufficiency, thus reducing the large transportation bill which it pays for both its products and goods consumed.

An interesting disclosure is the large aluminum reduction capacity built in the Northwest under the war program and totalling 308,000 tons per year. Although composing only a fourth of our present capacity, this alone is roughly twice our prewar consumption of the metal. Mention is also made of the large DPC-Alcoa continuous sheet aluminum mill now in operation in the Spokane area, with a capacity of 120,000 tons per year. Plants for magnesium, ferrosilicon, and electrolytic manganese are also mentioned.

Qualitative mention is made of a



LEGEND OF DAMSITES

COLUMBIA RIVER	CLARK FORK RIVER	WILLAMETTE RIVER	SNAKE RIVER AND TRIBUTARIES
1 Bonneville	12 Z Canyon	16 Fern Ridge	20 Quartz Creek	23 Five Mile Rapids	27 Cascade
2 The Dalles	13 Albeni Falls	17 Cottage Grove	21 Sweet Home	24 Steamboat Bend	28 Anderson Ranch
3 John Day	14 Cabinet Gorge	18 Dorena	22 Detroit	25 Rice Bar	29 Palisades
4 Arlington	15 Hungry Horse	19 Lookout Point		26 Dry Gulch	
5 Umatilla					
6 Priest Rapids					
7 Rock Island					
8 Rocky Reach					
9 Chelan					
10 Foster Creek					
11 Grand Coulee					

SYMBOLS = Existing dam; Programmed dam; Future dam

long list of mineral raw materials occurring in the Pacific Northwest, but except for those which are well known, little information is given. The list includes: high-alumina, refractory, china, and ceramic clays, magnesite, dolomite, iron, coal, chromium, nickel, manganese, silica, copper, lead, zinc, limestone, gypsum, garnet, diatomite, barite, pumicite, vermiculite, sheet mica, feldspar, and talc.

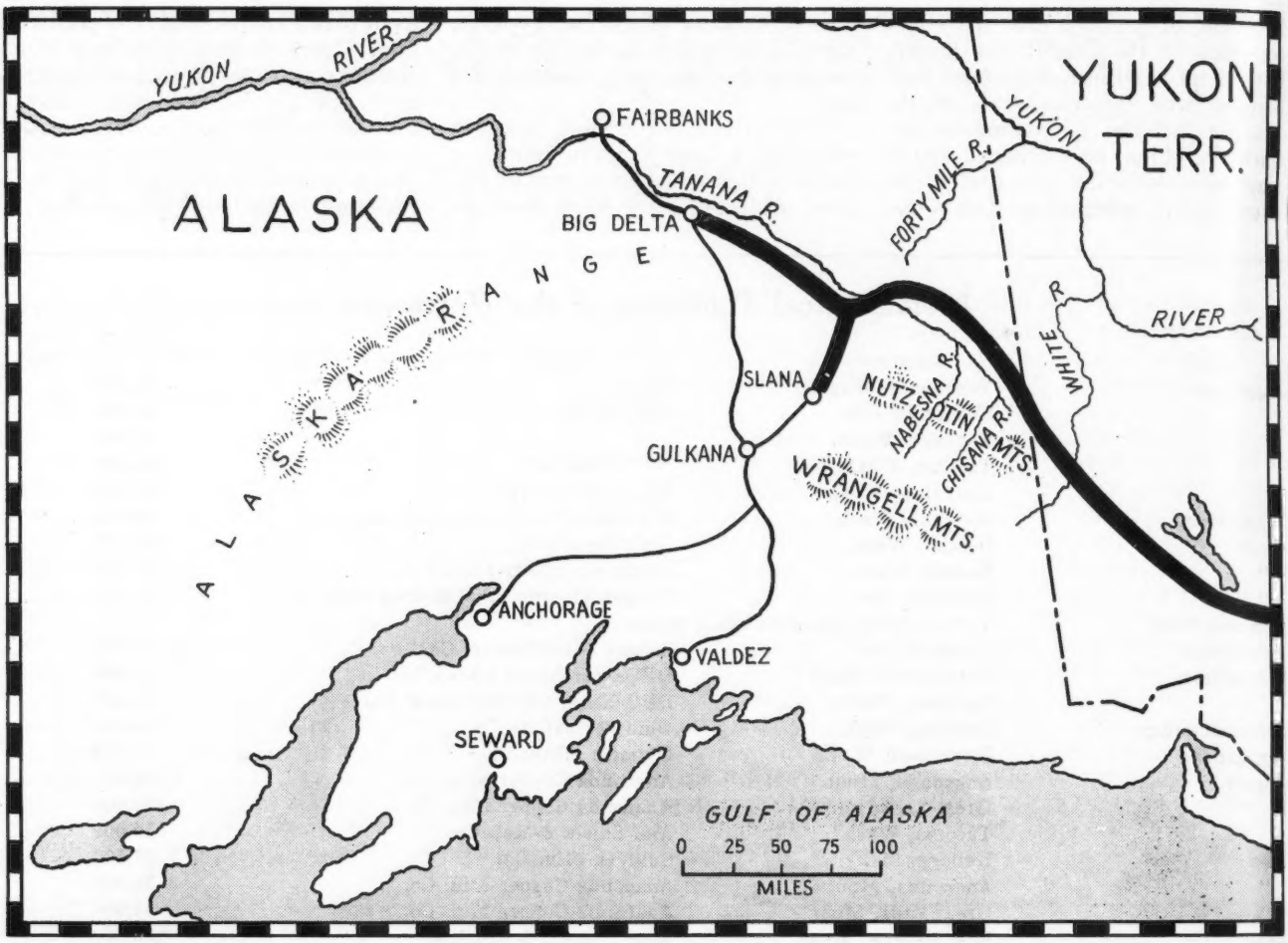
Obviously, the proposed program will take a long time to fulfill, as many factors are interdependent, and must wait upon the slow development of markets or growth of population. Nevertheless, although the entire picture portrayed may never be completely fulfilled, it is evident that development of the Northwest's power resources will greatly facilitate general industrial development, and therefore growth of population.

Metallurgical Facilities of the Northwest

Metal	*Location*	*Owner or Operator*	*Capacity, Tons Output per Year*
Aluminum	Vancouver, Wash.	Alcoa	91,000
"	Troutdale, Ore.	DPC-Alcoa	65,000
"	Spokane, Wash.	" "	97,500
"	Tacoma, Wash.	" -Olin Corp.	21,000
"	Longview, Wash.	Reynolds Met. Co.	33,000
Magnesium	Spokane, Wash.	DPC-Electro Metallurgical Corp.	18,000
Steel	Seattle, Wash.	Bethlehem Steel Co.	180,000
"	Seattle, Wash.	Northwest Electric Steel Co.	35,000
"	Portland, Ore.	Oregon Electric Steel Rolling Mills	35,000
Iron and Steel	Various foundries and casting plants		
Ferroalloys	Portland, Ore.	Electro Metallurgical Co.	5–10,000
Ferrosilicon	Wenatchee, Wash.	DPC-Wenatchee Alloys, Inc.	15,000
"	Spokane, Wash.	DPC-Electro Metallurgical Co.	20,000
Ferrochromium	Tacoma, Wash.	Ohio Ferroalloys Co.	18,000
Manganese	Hoodsport, Wash.	Olympic Mines Co.	1,400
Copper	Anaconda, Mont.	Anaconda Copper Min. Co.	1,000,000 (ore)
"	Great Falls, Mont.	Anaconda Copper Min. Co.	167,000
"	Tacoma, Wash.	Am. Smelt. & Ref. Co.	420,000
Zinc	Kellogg, Ida.	Sullivan Min. Co.	37,500
"	Anaconda, Mont.	Anaconda Copper Min. Co.	70,000
"	Great Falls, Mont.	Anaconda Copper Min. Co.	93,500
Lead	East Helena, Mont.	Amer. Smelt. & Ref. Co.	100,000
"	Kellogg, Ida.	Bunker Hill & Sull. M. & C. Co.	70,000
Brass Foundries	Various		
Job Galvanizing	"		

Capacities of Individual Dams

Name	*Power, Kilowatts*	*Storage Acre-Ft.*	*Navigation Feet Depth*	*Status*
Albeni Falls	None	1,500,000	None	Programmed
Anderson Ranch	Yes	Yes	None	Construction
Arlington	400,000	None	9	Future
Bonneville	518,000	None	27	Built
Cabinet Gorge	99,000	None	None	Programmed
Cascade	120,000	Yes	None	Programmed
Chelan	408,000	None	None	Future
Cottage Grove	None	33,000	None	Built
The Dalles	568,000	None	9	Future
Detroit	90,000	Yes	None	Programmed
Dorena	None	Yes	None	Future
Fern Ridge	None	102,000	None	Built
Foster Creek	675,000	None	None	Programmed
Grand Coulee	1,800,000	5,200,000	None	Built
Hungry Horse	142,000	1,440,000	None	Programmed
John Day	480,000	None	9	Future
Lookout Point	None	Yes	None	Future
Lower Snake (4)	Yes	None	6	Programmed
Palisades	30,000	Yes	None	Programmed
Priest Rapids	540,000	None	None	Future
Quartz Creek	None	Yes	None	Future
Rock Island	240,000	None	None	Construction
Rocky Reach	270,000	None	None	Future
Sweet Home	None	Yes	None	Future
Umatilla	630,000	None	9	Programmed
Z Canyon	Yes	?	None	Future



THE ALCAN HIGHWAY, in Alaska, runs northwest from the Canadian boundary, following the north side of the Tanana valley for 100 miles, crossing the river near its junction with the Tok. From here it continues west about 100 miles to Big Delta, its official terminus where it joins the Richardson Highway which runs from Valdez to Fairbanks. From Tok Junction a branch runs to Slana, as shown.

Alaskan Mining Should Gain From Alcan Highway

HOWARD C. WILCOX, *Dean, School of Mines, University of Alaska*

BETWEEN THE Alaskan-Canadian boundary and Fairbanks stretches 310 miles of road which is generally regarded as the Alaskan portion of the Alcan Highway. Actually, the Alcan Highway ends at Big Delta, 88 miles southeast of Fairbanks, and the traveler who is continuing on to Fairbanks must use the Richardson Highway which runs from Valdez to Fairbanks passing through Big Delta.

After leaving the boundary, the Alcan Highway follows the north side of the valley of the Tanana River for 100 miles, crossing the latter at its junction with the Tok River, which flows into it from the south. At Tok Junction, so-called, a branch of the Alcan Highway turns off south to Slana, 72 miles away, the main road proceeding on to Big Delta. Slana is also connected with Gulkana, on the Richardson Highway, by a branch road. Completing this network of roads, the Glenn Highway links the Richardson highway with Anchorage to the west, via Palmer immediately north of Anchorage. Inasmuch as the Palmer-Tok Junction road can be kept open through the winter, the Alcan Highway has a direct year-round connection with Anchorage as well as with Fairbanks.

If Fairbanks is considered the northern terminus, in reviewing the

mineral deposits, the only mine producing strategic minerals is a scheelite property about 15 miles from town. This mine is accessible to the Alcan Highway but is still being serviced by an old road. Actually, the region to be most benefited by the new highway lies southeast of Big Delta and includes districts on the north and south sides of the Tanana River.

South of the Tanana the district extends along the north side of the Alaska Range including the Nutzotin Mountains and part of the north slope of Wrangell Mountains. The principal rivers flowing northward into the Tanana commencing with the Delta River and named from west to east are: Gerstile, Johnson, Robertson, Tok, Tetlin, Nabesna and Chisana. The heads of the White River, Snag River and Beaver Creek are on the Alaskan side of the boundary but they drain into the Yukon, giving this district a natural outlet to the Highway on the Canadian side.

The Alcan follows the south side of the Tanana River from Big Delta to about twenty miles due east of Tanacross; there a steel bridge takes the road to the north bank, where it continues to the boundary. The drainage divide between the Tanana and Yukon rivers lies very close to the Tanana just east of Tanacross. The headwaters of Dennison Fork of the Fortymile, a tributary of the Yukon, is less than ten air line miles from the Highway, and the headwaters of the West fork of the Ladue River are only two or three miles away at the nearest point; consequently, the headwaters of these two streams which have been remote from transportation and which lie in mineralized country are now accessible. The Goodpaster and Healy rivers, being on the opposite side of the Tanana from the Highway, are not as directly affected as are the Dennison Fork and Ladue.

The White River and Adjacent Region

Tales of copper occurrences in the White River district told by the Indians to their white brothers brought prospectors into this district as early as 1899. As is usually the case the tales proved, to be greatly exaggerated, though a number of copper prospects were located. A small gold placer stampede to Beaver Creek occurred in 1902 and some of the miners stayed to prospect for copper when no workable gold values were found.

Copper occurs as the native mineral in placer deposits, the nuggets ranging in size from small shot to large pieces weighing several pounds. The source of the nuggets is the amygdaloidal lavas, and Kletsan Creek is believed to have been the source of most of the copper obtained by the natives. The greatest concentration is thought to be on the Canadian side of the boundary.

There are two ways in which copper occurs in lode deposits, the most common being in association with the amygdaloidal basalts; less common is association with limestone at or near the contact with granitic intrusives. Metallic copper occurs in two ways—as a primary mineral and as an oxidation product of the original sulphides: chalcocite, bornite and chalcopyrite; however the principle occurrence has been caused by oxidation. A native copper slab, 8 by 4 ft. and 4 in. thick and weighing about three tons, is located on White River a few miles below the International Boundary. This slab has resulted from oxidation of copper mineral in the amygdaloid; smaller slabs, formed by the same process, are known to occur near by. Chalcocite, bornite and chalcopyrite sometimes occur as disseminations and small discontinuous stringers, but there have been no indications of lode or sizable veins in the ancient lava flows. In speaking of the contact metamorphic deposits Moffit and Knopf[1] state that bornite and chalcopyrite are intergrown with garnet, coarsely crystalline calcite, epidote, specular hematite and scattered flakes of molybdenite in limestone; only two deposits of this type were seen in place but evidence of energetic contact-metamorphism was detected in a number of other localities. Of the large number of copper claims staked at the head of White River a few groups have been patented but the majority have been allowed to lapse. The expense of mining and shipping copper from this district was such that pure copper could not be taken out at a profit. The general geology is favorable for the occurrence of mineral deposits and mineralization is widespread; in view of decreased costs made possible by the construction of the Highway it would seem the reexamination of old locations and additional prospecting would be warranted.

Two copper[2] prospects on Snag River which were known as the Reynolds and Sulzer, or O'Hara, properties and which are owned by Chisana Mines, Inc., have had exploratory work done on them in recent years. The mineralization is in greenstone at both properties.

As mentioned, the gold placer stampede to Beaver Creek in 1902 developed no workable deposits and no promising prospects have since been found. Extensive placers would not be expected in a region so severely glaciated, but limited placers might have developed where favorable conditions for a reconcentration of low-grade gravels have developed since the withdrawal of the ice.

Two gold lode prospects are men-

[1] Moffit, F. H., and Knopf, Adolph, Mineral Resources of the Nabesna-White River district, Alaska; U.S. Geol. Survey Bull. 417, pp. 58–60, 1910.

[2] Moffit, Fred H., Geology of the Nutzotin Mountains, Alaska. U.S. Geol. Survey Bull. 933 B, pp. 169–170, 1943.

TO FAIRBANKS from Big Delta it is 88 miles along the Richardson Highway, here seen in a winter scene as this link approaches Fairbanks.

tioned by Moffit.[3] One, on Carden Creek on the northeast side of the Nutzotin Mountains between Snag River and Beaver Creek, has a short tunnel driven in the schist or phyllite and close to a small body of granodiorite. The other is on the south side of Beaver Creek about one mile above the mouth of Ptarmigan Creek and some three miles from Horsfeld. A shattered area in gabbroic rock is mineralized with arsenopyrite and pyrrhotite with minor amounts of quartz, calcite and pyrite. The Acme Mining (Simms Company) who did some diamond drilling on the property have done nothing since 1938.

Nabesna-Chisana District Has Been Productive

The Nabesna and the Chisana rivers, which join below Northway to form the Tanana, cut through the Nutzotin Mountains and are fed by glaciers which lie on the north flank of the Wrangell Mountains. Granitic intrusives outcrop on the south flank of the Nutzotin Mountains and gold, copper, molybdenite, lead and zinc mineralization are associated with the intrusives. Lode-gold and placer-gold were the only profitable operations in this area up to 1942.

The Nabesna lode mine which produced approximately $1,870,000 from 1931 to 1940, and which paid a dividend in 1938 equal to the invested capital, has been the outstanding development. It is on White Mountain, north of the Nabesna River, between Jack and Jacksina Creeks. Wayland[4] states that:

"The principal ores of the Nabesna mine are discontinuous veins of pyrite with calcite and lesser amounts of chalcopyrite, sphalerite and galena. The veins have formed by replacement of the limestone along fractures and contacts. The ore shoots range in thickness from a few inches to 35 feet and average 5 to 7 ft."

The ore shoot on the principal vein of the present mine appears to to be delimited but there are other veins on the property which have not been prospected thoroughly.

Claims were first staked on this property in 1902 but not until 1924 was the producing vein exposed, this by a bear digging off moss in search of a gopher.

The Chisana (Shushana) gold placer deposits were discovered in the spring of 1913 and a stampede to the district followed. It was soon learned that the profitable placer area was limited and was restricted to Bonanza Creek and the immediate vicinity on the north. The first three years of mining resulted in a production of $460,000; that of the following 24 years—1916 to 1940—amounted to approximately $310,000, making a total of $770,000. The gold production from this district is not expected to increase above the present rate but it may be maintained for a few years.

Molybdenite occurs in some of the metamorphosed limestones and lead-zinc minerals are reported to occur in one prospect, but at present neither type deposit seems to have commercial possibilities. The most likely chance for future development seems to be in the gold lode deposits and the most favorable place for prospecting is in the areas close to the granitic intrusives.

Several gold-bearing veins have been discovered in the vicinity of Bonanza Creek. One group of 16 claims known as the Erie is located on the side of the mountain above Chatenda Creek. The claims are owned by Earl Hirst and Sam Gamblin; in 1940 they started a tunnel about 800 ft. above the creek and report that the veins carry silver and gold. The principal minerals are pyrite and galena. Another prospect on Chatenda Creek has had two short tunnels driven on a zone of sulphide bearing quartz veins.

Claims covering copper deposits were staked before 1902 but none of them have been brought into production. Eighteen claims covering a mineralized area on Orange Hill have been patented by the owners, the Alaska Nabesna Corporation. Orange Hill is just below Nabesna glacier on the east side of the Nabesna River. According to Moffit,[5] alteration of the limestone was accompanied or followed by the introduction of ore minerals, which include, in addition to pyrite and molybdenite, magnetite, pyrrhotite, and chalcopyrite. Gold, silver and copper are present. It seems evident that profitable operation will depend on the handling of large tonnage of the ore, which is in considerable quantity, although of low grade.

ON THIS ANTIMONY PROSPECT, on ground recently relocated by Sam Gamblin on Boulder Creek, a tributary of the Tok River, stibnite is exposed in the bank above the gravel in a good-sized block.

In the Slana-Tok Area

This district includes drainage on both sides of the Alaska Range. The Tetling, Tok and Robertson rivers flow north into the Tanana and Slana, Ahtell Creek, Indian Creek and Chistochina River flow south into Copper River. This district is connected with the Alcan Highway by the Slana cut-off which leaves the highway at Tok Junction and connects with the Nabesna road at Slana.

The mineral resources[6] consist of lode and placer deposits. The placer deposits have produced native gold, silver and copper while the lode

[3] Same, pp. 163, 164, 1943.

[4] Wayland, Russell G. Gold Deposits Near Nabesna. U.S. Geol. Survey Bull. 933 B, p. 185, 1943.

[5] Moffit, Fred H. Geology of the Nutzotin Mountains, Alaska. Geol. Survey Bull. 933 B, pp. 166–167, 1943.

[6] Moffit, Fred H. Geology of the Slana-Tok District, Alaska. U.S. Geol. Survey Bull. 904, pp. 42–51, 1938.

deposits are known to contain gold, silver, copper, stibnite, galena, tetrahedrite, sphalerite and pyrite.

The only placer deposit to be worked in recent years is on Grubstake Creek, a tributary of Ahtell Creek, about 5 miles from the Highway. This deposit was found by the early prospectors but was abandoned a number of years ago. In 1934 Charles Swanson and M. G. Olson began mining the creek on a small scale and they have expanded their operations and taken in partners until they now have three groups of claims both placer and lode.

The Slate Creek placer which was discovered in 1898 has been worked until gold mining ceased in 1942. It is on a tributary of the Chistochina River and just west of this district.

Several mineralized quartz veins are known and recently some of the better known prospects have been relocated. Two prospects on Indian Creek and two on Ahtell Creek which seem to have some merit have been described by Moffit. The veins on Indian Creek occur in quartz diorite and range up to 7 ft. in thickness and are filled with iron-stained quartz containing galena. The two veins on Ahtell Creek are in quartz diorite also and the quartz vein matter contains sphalerite, tetrahedrite, pyrite, chalcopyrite and galena. No production has come from any of the gold lodes but the increased price of gold and better transportation now available warrant the re-examination of old prospects and additional prospecting in this district.

A stibnite-bearing mineralized area on a tributary of the Tok River about 7 miles above the mouth of the Dry Tok has been relocated by Sam Gamblin and additional work has been done there recently. The stibnite occurs as both granular and crystalline and is exposed in the creek bank above the gravel in a block about 25 x 25 ft.

Gerstile-Johnson River District Small

This district is relatively small, being about 40 miles from east to west and 35 miles from north to south. The principal traversing streams, named from west to east, are: Delta River, Jarvis Creek, Gerstile River, Little Gerstile and Johnson River. Several outcrops of granitic intrusives occur in the area and some mineralization has taken place, as shown by gold in the streams and in quartz veins containing pyrite and galena. Considerable prospecting for gold-placer was carried on about the time the Fairbanks district was discovered but no workable deposits were developed. Early prospecting failed to discover any mineralized quartz veins of economic importance, but recently one of the most promising occurrences has been restaked.

Along the Goodpaster and Healy Rivers

The Goodpaster and Healy rivers, tributaries of the Tanana, enter the stream on the opposite side from the Highway and are only indirectly benefited by it. Several promising gold lode prospects have been found on the upper Goodpaster and, in 1936 and 1937 some development was done on a group of claims optioned by American Smelting and Refining Company. Difficulties of transportation and other reasons caused the company to relinquish the option. Several other camps continued explorations into 1941 and a mill was installed on one prospect by C. W. Tibbets. High cost of labor and supplies combined with the transportation problem has caused development work to stop. The ore is gold-bearing and a high percentage of gold is free in the quartz which carries only small amounts of sulphides.

Molybdenite and gold have been reported as occurring on Healy River, and asbestos has been reported on the Volkmar River which enters the Tanana a short distance below Healy River.

Headwaters of the Ladue and Fortymile Rivers

As mentioned, the Highway approaches within 8 miles of the headwaters of the Dennison Fork of the Fortymile and within 2 or 3 miles of the headwaters of the Ladue after it crosses the Tanana about 20 miles above Tanacross. The headwaters of the Dennison Fork and Ladue rivers are characterized by wide, flat valleys and profitable placers have not been found in this district. Little prospecting for lode deposits has been carried on as the region has been too remote from established transportation lines. Farther north, in the Fortymile drainage area, antimony and lead minerals are known to occur near the headwaters of the Middle Fork of the Fortymile; copper minerals have been found on Ketchumstuk Creek, a tributary of the Mosquito Fork.

In the region adjacent to the Highway granitic intrusives have been mapped[7] in this district and the general geologic conditions are favorable for the occurrence of mineral deposits. While travelling by automobile from Tanacross to Northway, I stopped to examine some mineralized outcrops in one of the Highway cuts on the north side of the Tanana River. The alteration products of arsenic minerals were prominent and several stringers were exposed in the road cut. A sample was taken across a 10-in. quartz vein which contained arsenopyrite and an assay made which showed a gold content of $30 per ton. This evidence of valuable mineralization, with the favorable geologic conditions, makes this district worthy of attention.

Some Obstacles

Natural obstacles incidental to prospecting and mining under subarctic conditions, such as frozen ground, swamps, swollen glacial streams, rough terrain, mosquitoes, short summers and severe winters, must be counted upon in the region adjacent to the Alcan Highway. In addition to these difficulties, in Alaska, there is the man-made restriction which does not permit the locating of mining claims within a zone which extends ten miles on either side of the Highway. The withdrawal of the 20-mile strip has effectively stopped exploration for minerals in the adjacent districts, and prospecting and mining must await the removal of the restriction.

Possibilities

The association of mineral deposits with granitic intrusives has been clearly demonstrated in various mining districts, and the occurrence of valuable mineral deposits in and adjacent to the smaller bodies, such as stocks, dikes, and sills, is more general than with the large batholiths. The areas around all of the small intrusives do not contain valuable minerals, but they are the most likely places to look for mineral deposits. In Alaska, the districts on the north and on the south of the Alcan Highway contain a number of smaller intrusive-granitic masses which are associated with known mineral occurrences. While, in most cases so far, these mineral occurrences have not proven to be of great economic importance, re-examination of old prospects and additional prospecting are warranted and should be encouraged in the districts which have become more accessible.

[7] Mertie, J. B. Jr. Yukon-Tanana Region, Alaska. U.S. Geol. Survey Bull. 872, plate 1, 1937.

Cerro de Mercado—Mexico's Iron Mountain

LIC. ALBERTO TERRONES BENITEZ, *Calle Tacuba 92, Mexico, D.F.*

APPROXIMATELY A MILE AND A QUARTER north of the city of Durango, in Mexico, is the Cerro de Mercado, Mexico's "iron mountain," which protrudes like an enormous outcrop at one edge of the Guadiana Valley, rising to a height of 630 ft. above its base. It takes its name from its discoverer, Gines Vazquez de Mercado, who entered the region in 1552 from Guadalajara with a party of men, charged with the task of pacifying the natives and incidentally looking for a mountain of silver rumored to exist. Instead he found a mountain of iron. Eleven years later Capt. Alonzo Pacheco established the settlement where Durango City now stands.

Almost three centuries passed before the first attempt to use the iron ore was made, this in 1828. A company was organized, a small production achieved. In 1881 W. L. Helfenstein organized the Iron Mountain Company and the first foundry was erected a year later at the foot of the hill at the west end. This company next transferred its interest to the Mexican Iron Mountain Mfg. Co. incorporated in Des Moines, Iowa. In 1888 the latter's interest was acquired by the Durango Steel & Iron Co. controlled by James A. Callahan.

Finally, in 1920, Callahan's heirs sold out to the Compania Fundidora de Fierro y Acero de Monterrey S.A. which up to the present has devoted its attention to the western portion of the iron mountain. For this purpose a subsidiary, Cerro de Mercado S.A., was organized in 1934, owning the most important mining claims covering an area of 470 acres.

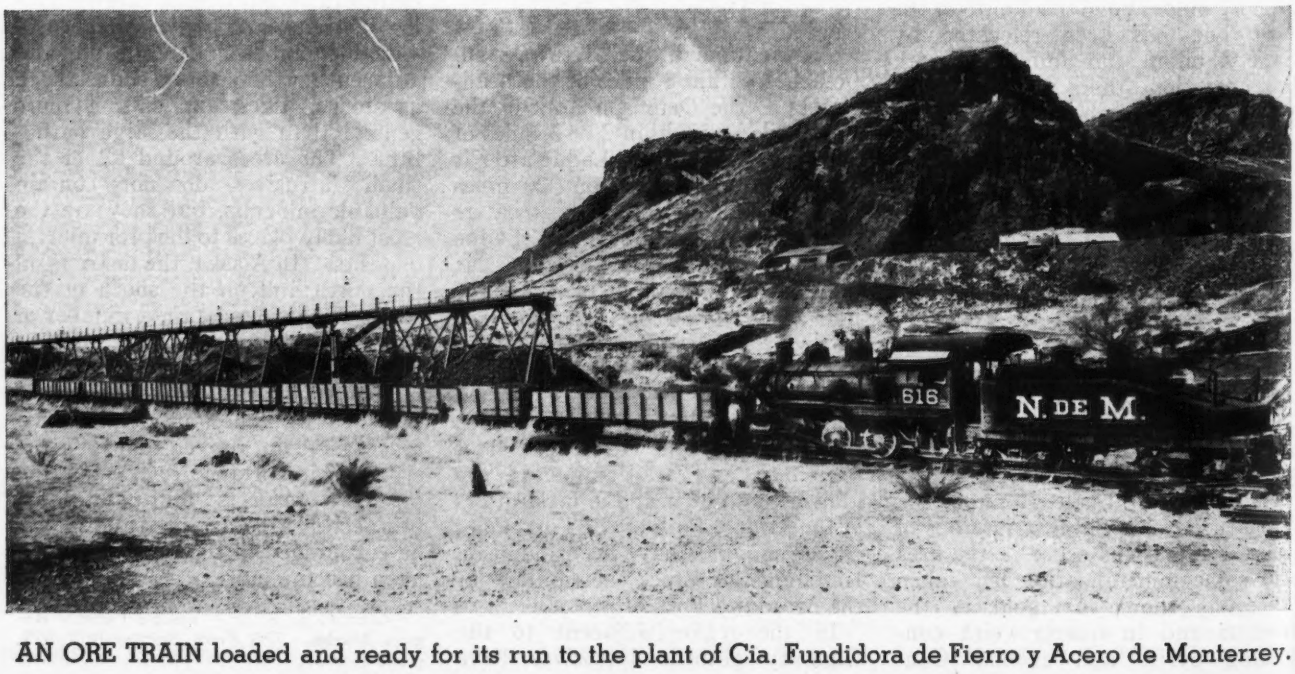
From the mine to Monterrey, via Torreon, is 386 miles and to Mexico City, via Felipe Pescador (formerly Cañitas) 675 miles. North and west communications are defective, railroad construction having stopped, for reasons unknown, at Tepehuanes and El Salto lumber mills.

Geology and Genesis

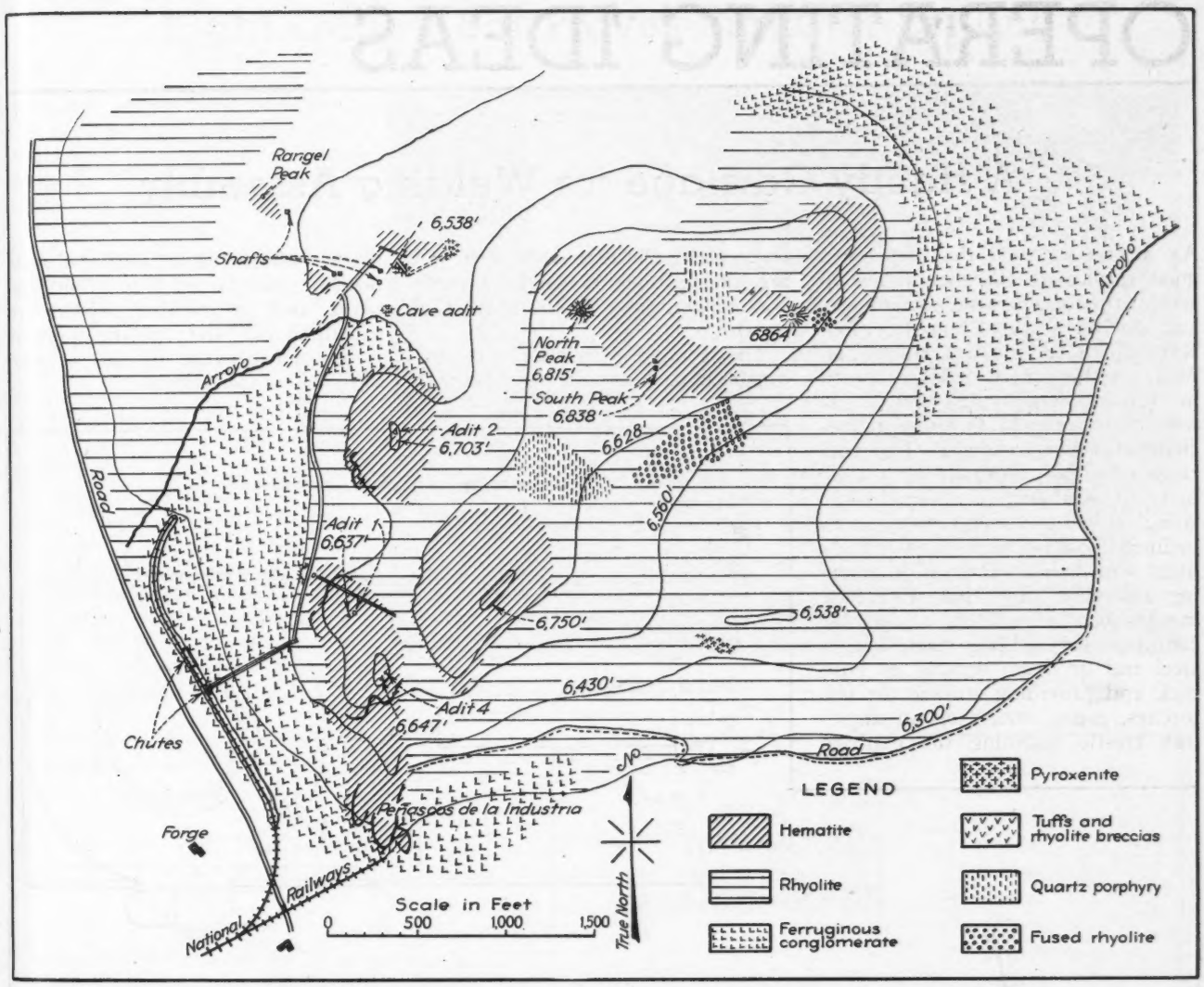
Apparently the Cerro de Mercado is a result of intensive erosion; the sedimentaries around the mountain were washed away. Tertiary rocks, such as andesites, were in turn eroded and then rhyolite lavas and rhyolite tuffs which also suffered from erosion. The youngest effusive is the basalt which covers large areas along the valley under the names *breña* and *malpais*.

The relation between the rhyolite (country rock) and the iron ore deposit, composed principally of hematite, is evident; but aside from this, the presence of pyroxenite dykes radiating from the iron mountain into the rhyolite formation has also importance as regards the origin of the mineral deposit; these dykes may originate from an intrusive, probably a batholith, according to the investigation made by the Instituto Geologico de Mexico under Leopoldo Salazar Salinas.

The principal minerals are: hematite, martite and magnetite, the latter occurring infrequently, with subordinate limonite and ochers in the weathered areas. The most important gangue minerals are: quartz, including chalcedony; apatite, locally called *biriles;* asbestos, of the variety called "mountain leather"; and



AN ORE TRAIN loaded and ready for its run to the plant of Cia. Fundidora de Fierro y Acero de Monterrey.



GEOLOGIC MAP of Cerro de Mercado and immediate vicinity. The southwest-northeast ridge rises 630 ft. above its base, which in turn is 6234 ft. above sea level. Workings described are at southwest end.

hedenbergite-diopside, this last one in the pyroxenite dykes.

Various opinions have been expressed as to the genesis of the iron deposits. After a careful survey of the mountain in 1922 and 1923, and with the data obtained from the then recent mining exploration, the staff of the Instituto Geologico de Mexico, under Leopoldo Salazar Salinas, concluded that the Cerro de Mercado originated through magmatic segregation (see Bulletin No. 44) and is associated with an intrusive batholith of which the surface indications are the ultra-basic pyroxenite dykes with attendant pneumatolitic phenomena.

Tonnage of iron ore in the mountain has been estimated at 76,300,000 from its base up. Cia. de Fierro y Acero de Monterrey S.A. began its work on the Cerro de Mercado after 1920. From that year to the present date the total production has been about 2,000,000 metric tons of iron ore. Between 1920 and 1929 the average yearly output was 59,000 tons, the highest figures corresponding to 1925 and 1929.

Between 1930 and 1935 the average production increased to 74,000 tons per year, the maximum during 1934. From 1936 to 1942 the average yearly output increased further to 128,000 tons and the maximum of 160,180 tons took place during 1942. This year an increase of the production to at least two times the former average is expected as a result of the improvements in the company's Monterrey foundry at a cost of about $14,000,000 pesos, meaning a total yearly production of steel at the rate of 180,000 tons.

Exploration of the mineral deposit was originally undertaken by means of adits, crosscuts and trenches; but lately preference has been given to diamond drilling.

The iron is being worked by the open-cut method and in "benches" at various elevations; there is no underground development. An 800-ton crushing plant has been installed and is operated on the southern benches. The iron ore is hauled to it by gravity from the main 7th and 8th benches and by rail from the southern benches. Before the plant was erected all ore from the higher benches was transported by an aerial tramway at the upper end of which a device was installed to separate the fines from the coarse: the former is taken direct to the railway loading station down below, and the latter is conveyed to the crushing plant which also has a direct connection with the loading station.

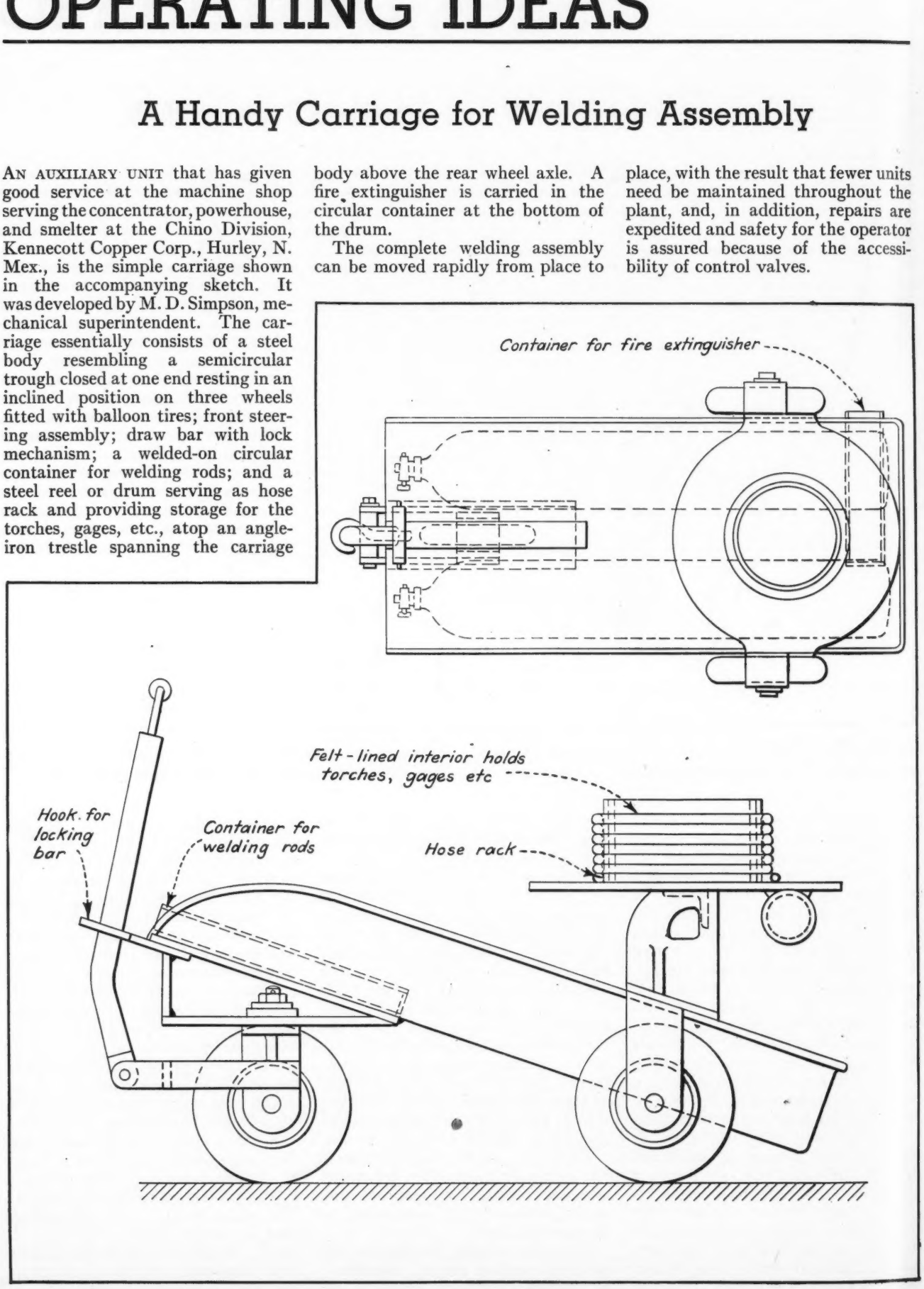
Average analysis of the ores from the Cerro de Mercado is as follows: Si, 3.5 percent; Fe, 62.0 percent; P, 0.5 percent; and S, 0.5 percent. The great bulk of the production goes to the Monterrey foundry. A small tonnage is distributed among local consumers and the Texas Mining and Smelting Company.

OPERATING IDEAS

A Handy Carriage for Welding Assembly

AN AUXILIARY UNIT that has given good service at the machine shop serving the concentrator, powerhouse, and smelter at the Chino Division, Kennecott Copper Corp., Hurley, N. Mex., is the simple carriage shown in the accompanying sketch. It was developed by M. D. Simpson, mechanical superintendent. The carriage essentially consists of a steel body resembling a semicircular trough closed at one end resting in an inclined position on three wheels fitted with balloon tires; front steering assembly; draw bar with lock mechanism; a welded-on circular container for welding rods; and a steel reel or drum serving as hose rack and providing storage for the torches, gages, etc., atop an angle-iron trestle spanning the carriage body above the rear wheel axle. A fire extinguisher is carried in the circular container at the bottom of the drum.

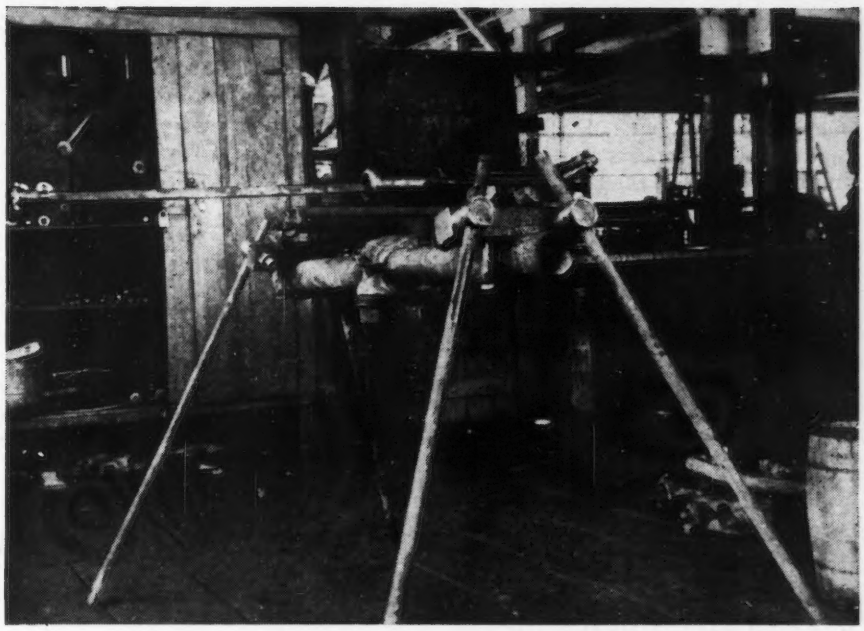
The complete welding assembly can be moved rapidly from place to place, with the result that fewer units need be maintained throughout the plant, and, in addition, repairs are expedited and safety for the operator is assured because of the accessibility of control valves.


Container for fire extinguisher
Felt-lined interior holds torches, gages etc
Hook for locking bar
Container for welding rods
Hose rack

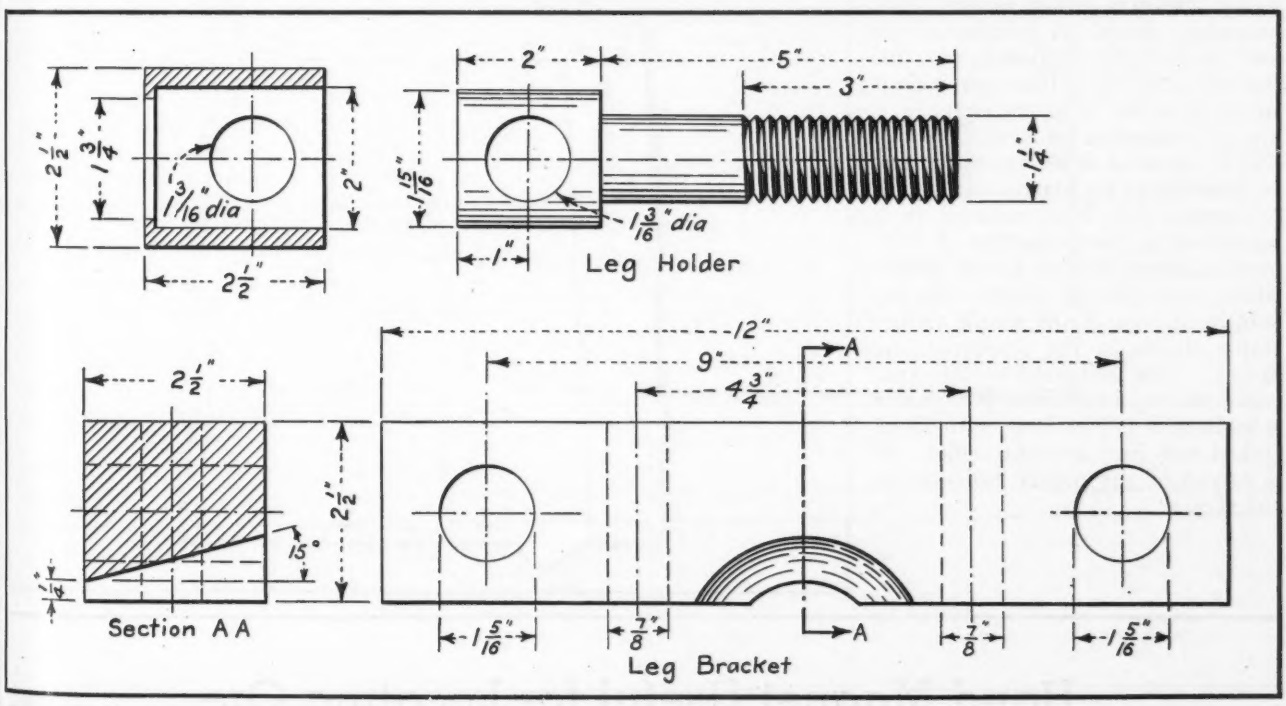
Light Quarry Bar Proves Rigid for Drilling

THIS LIGHT, FOUR-LEGGED QUARRY BAR is steadier and easier to handle than a tripod in open-cut work, according to W. A. Vickers, master mechanic for Neptune Gold Mining Co., Bonanza, Nicaragua. The legs, which are made of $1\frac{1}{8}$-in. hollow steel, are held on a bracket by a $1\frac{1}{4}$-in. bolt with a capstan head machined to fit inside of a $2\frac{1}{2}$-in. cylindrical cap. Construction details of the leg holders and the upper half of the leg bracket are shown in the accompanying illustration.

A half section of a safety clamp holds the leg bracket on the crossbar, which can be made from an old drill column. The leg bracket is inclined at an angle of 15 deg. from the crossbar. Standard clamp nuts are used throughout. Originally, old battery tappets were used to weight the legs, but this practice was abandoned when trial showed that additional weights were unnecessary.



Assembled quarry bar showing legs attached to brackets.

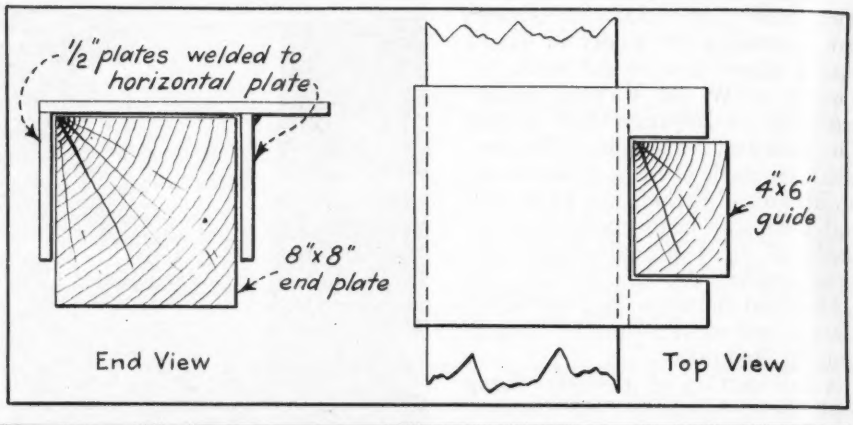


New Use for Discarded Elevator Buckets

DISCARDED BUCKETS from belt-type elevators make excellent storage containers for small parts, such as bolts, nuts, crews, and washers. A neat and easily accessible storage assembly can be provided at the mine, mill, or smelter machine shop by simply screwing a number of old buckets to a convenient section of the shop wall or an independent wooden board. The buckets come in lengths from 3 to 20 in. or more. Rivet holes, originally used to hold them to the belt, serve as screw holes to hold the buckets to the wall. The sloping fronts and rounded bottoms make it easy to pick out small parts stored in the buckets. A material reduction in loss of parts has been noted at shops where the assembly has been installed.

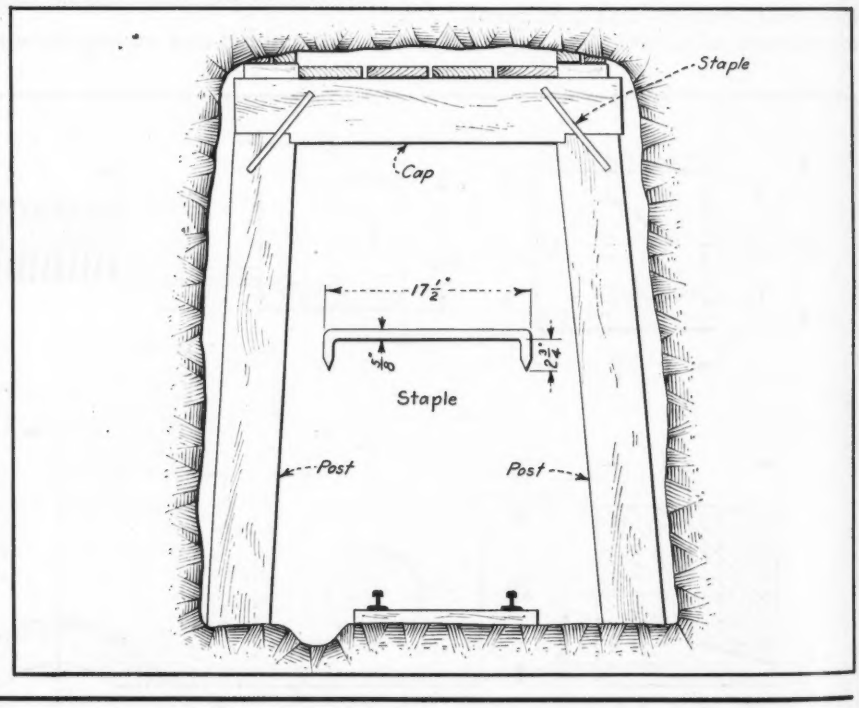
Landing Chair for Shaft Sinking Crosshead

A PORTABLE LANDING CHAIR for the crosshead of a shaft-sinking assembly has served satisfactorily at the property of Chromite, Ltd., St. Cyr, Quebec, Canada. G. K. Mitchell, mine engineer, reports that as shaft sinking progresses, the landing chairs can be installed on lower timbers quickly and easily because of the absence of bolts. The chairs are constructed of ½-in. all-welded steel plate. If the chairs are to be subjected to heavy impact, triangular webs can be welded below the horizontal plate.



Staple Gives Extra Stability to Tunnel Timber Sets

DAMAGED SETS often result during blasting operations in timbered drifts, crosscuts, and tunnels, causing in many instances costly repairs, with attendant delay. A member of the set particularly exposed to this hazard is the cap. If no provision is made to secure it to the posts by a special crosspiece or hook, the cap will be knocked down as soon as one or more blocks are blasted out. This occurrence has been reduced to a minimum at the properties of Anaconda Copper Mining Co. in Butte, Mont., and the iron mines in Minnesota by the use of the simple timber staple shown in the accompanying sketch. The unit used at the Anaconda mines, made from ⅝-in. round steel bars, is 17½ in. long, with 2¾-in. spiked ends bent at right angles. It is placed at the points indicated in the sketch.



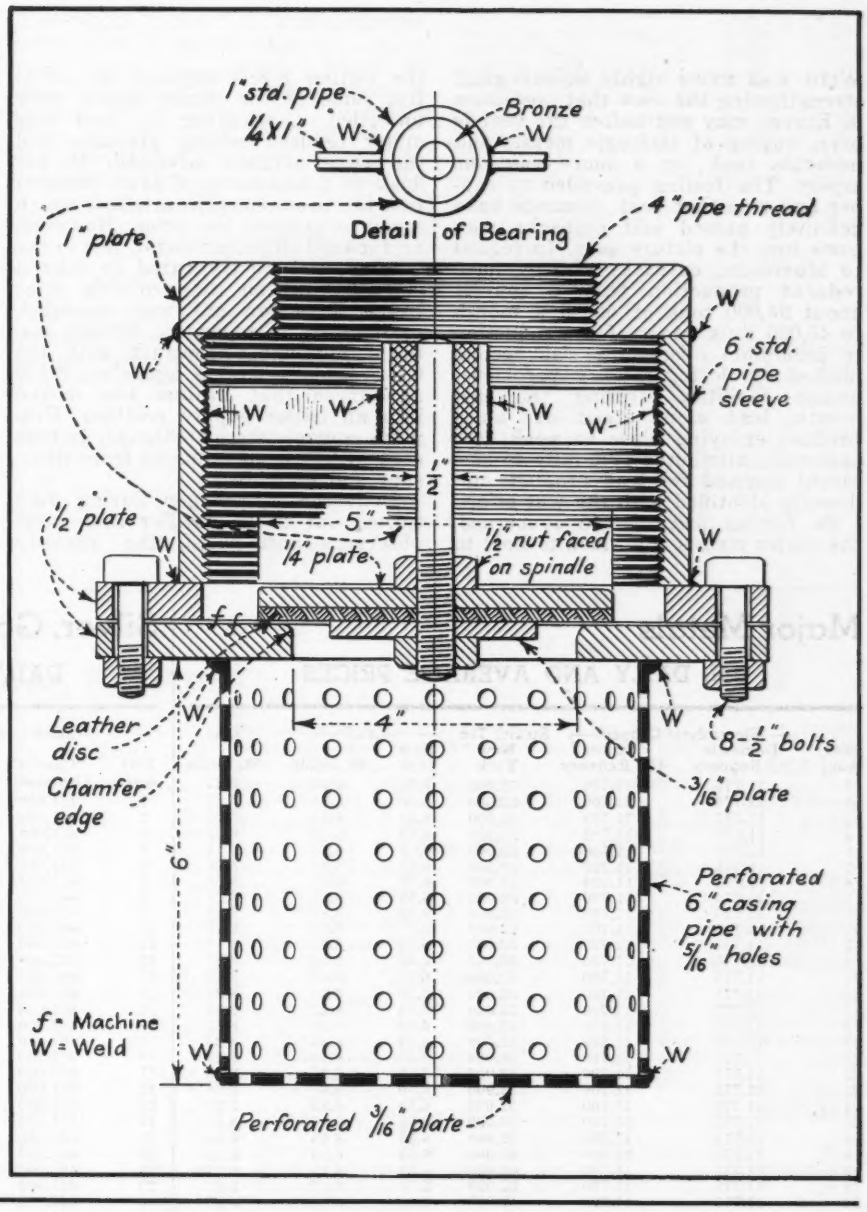
Hand Magnet Useful for Locating Ore

SUCCESSFUL EXPERIMENTS WITH A SMALL, powerful, Alnico, hand magnet have encouraged the following suggestions made by F. M. Morris, mining engineer at the Mt. Hope Division of the Warren Foundry & Pipe Corp., Mt. Hope, N. J. The magnet has been particularly useful in locating magnetic ore contacts in rock faces or exposures covered with a film of drill sludge or dust. Relative variations in the attraction between hidden mineral masses and the magnet roughly indicate the grade of ore as well as the position.

Wet or dirty diamond-drill cores can be scanned rapidly on the surface or underground. It is possible to detect the presence of magnetite or a magnetic zone instantly when the appearance or color of the core might indicate a total lack of magnetite. Skilled use of these strong magnets should make it possible to predict the assay of ore, broken or in place, within 10 percent of its iron content. Another possible use would be as an aid in differentiating quickly between magnetite, and martite, ilmenite, franklinite or any mineral otherwise resembling magnetite. The magnet used by Mr. Morris was obtained from Eimer & Amend, New York.

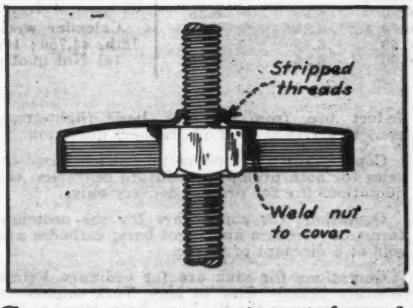
A Dependable Foot Valve

THE ACCOMPANYING ILLUSTRATION EXPLAINS in detail the construction of a 4-in. foot valve developed by Phil Keast, shop foreman, Empire Star Mines Co., Ltd., Grass Valley, Calif., for use on the suction pipes of small centrifugal pumps subject to pressures up to 200 lb. Mr. Keast writes that he has sixteen of these units in operation in different parts of the mine, some for a period of three years, and has found them satisfactory and dependable. The valve is made up of a top housing consisting of a 6-in. standard pipe sleeve with a circular piece of 1-in. steel plate (4-in. pipe thread in center) welded to one end, and a flange made from $\frac{1}{2}$-in. steel plate welded to the other; valve assembly proper; and a valve seat with a welded-on strainer unit, or windbore. The strainer unit perforated with $\frac{5}{16}$-in. holes is a short length of 6-in. casing, with a perforated $\frac{3}{16}$-in. steel disk at the bottom, spot-welded to the valve seat proper made from $\frac{1}{2}$-in. steel plate. The valve stem guide assembly in the top housing consists of a piece of 1-in. pipe $1\frac{1}{2}$ in. long filled with bronze (with acetylene torch) and subsequently faced in the lathe and provided with a $\frac{1}{2}$ in. bore in the center, and two supports made from $\frac{1}{2}$ x 1 in. steel. A short length of cold-rolled steel threaded at one end constitutes the valve stem. The valve proper is made up of a leather disk and two steel disks cut from $\frac{3}{16}$- and $\frac{1}{4}$-in. plate. Mr. Keast states that although the valve has operated as frequently as 100 times a day, it has served in automatic pumping stations for months without trouble or repair.



Effective Grease Gun Repair

THE THREADS in the screw cover of a pressure grease gun, reports Charles Labbe, of Las Vegas, Nev., often become damaged from a variety of causes because of the relative weakness of the part. When the threads are stripped and the cover is therefore useless, a simple repair may be made by removing the cover from the threaded rod, welding a nut of the proper size inside the cover, as shown, and replacing the cover. This repair, says Mr. Labbe, will outlast the grease gun, itself.



Grease gun cover is reinforced by simple welding job.

Let's Have It!

If your ingenuity has solved an operating problem, don't be modest about it. Tell us. Send in a sketch or description. Our readers have similar problems and welcome you solutions.

E.&M.J. pays $5 for every item accepted for publication.

MARKET SUMMARY

WITH WAR NEWS highly encouraging, strengthening the view that hostilities in Europe may end before the year is over, buying of strategic metals and minerals took on a more cautious aspect. The feeling prevailed in copper and zinc that peak demands have definitely passed and cutbacks may come into the picture soon. In regard to aluminum, cutbacks already have reduced production from a top of about 94,000 tons of metal a month to 45,000 tons. Most of the reduction in aluminum operations was accomplished by closing down government-owned facilities. During the last month, lead alone stood out as a product enjoying close to peak consumption, attributed generally to sustained demand for lead products not directly identified with the war effort.

So far as prices were concerned, the major metals continued to hold to the ceiling levels imposed by OPA. But some of the minor metals were unsettled. Quicksilver on spot was under reduced selling pressure and the price actually advanced $3 per flask to a minimum of $105. Production has been sharply curtailed, which tends to support the price. However, on forward shipment metal, few in the quicksilver industry cared to take a definite view on the probable price trend. Tungsten ore was unsettled, particularly in regard to foreign material not under contract with the Government's buying agencies. WPB announced that lithium has moved into an easier supply position. Uranium controls were tightened. Import control has been removed from fluorspar and ilmenite.

Deliveries of copper during July turned out to be smaller than most observers anticipated, the quantity moved by producers amounting to 121,705 tons, against 140,932 tons in June and the peak of 165,714 tons in May. Fabricators reported consumption for July at 118,632 tons, which compares with 149,718 tons in June. Vacations and plant repairs contributed to the reduced needs of consumers. Domestic production of crude copper for July was 85,734 tons, according to Copper Institute, which contrasts with 89,102 tons in June and the peak for the current year of 101,289 tons in March. Reduced home production has been offset by larger importations from Canada. The Government's stockpile of copper has increased to around 290,000 tons as of the end of August.

Consumption of lead remains at a high level, with the trade drawing heavily on foreign metal to round out their needs. Total deliveries for August were estimated at between 65,000

Major Metals

U.S. DAILY AND AVERAGE PRICES

1944 Aug.	Electrolytic Copper: Domestic (a) Refinery	Electrolytic Copper: Export (b) Refinery	Straits Tin New York	Lead: New York	Lead: St. Louis	Zinc St. Louis
1	11.775	11.700	52.000	6.50	6.35	8.25
2	11.775	11.700	52.000	6.50	6.35	8.25
3	11.775	11.700	52.000	6.50	6.35	8.25
4	11.775	11.700	52.000	6.50	6.35	8.25
5	11.775	11.700	52.000	6.50	6.35	8.25
7	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
10	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
12	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
17	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
19	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
24	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25
26	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
29	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
31	11.775	11.700	52.000	6.50	6.35	8.25
		AVERAGES FOR MONTH				
Aug.	11.775	11.700	52.000	6.50	6.35	8.25
		AVERAGES FOR WEEK				
Aug. 2	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
		CALENDAR WEEK AVERAGES				
Aug. 5	11.775	11.700	52.000	6.50	6.35	8.25
12	11.775	11.700	52.000	6.50	6.35	8.25
19	11.775	11.700	52.000	6.50	6.35	8.25
26	11.775	11.700	52.000	6.50	6.35	8.25

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

1944 Aug.	Sterling Exchange: "Checks" (Nominal)	Sterling Exchange: "90-day demand"	Silver: (c) New York	Silver: London	Gold: London	Gold: (d) United States
1	401.000	(f)	44.750	23.500	168s	$35.00
2	401.000	(f)	44.750	23.500	168s	35.00
3	401.000	(f)	44.750	23.500	168s	35.00
4	401.000	(f)	44.750	23.500	168s	35.00
5	401.000	(f)	(e)	(e)	(e)	35.00
7	401.000	(f)	44.750	Holiday	Holiday	35.00
8	401.000	(f)	44.750	23.500	168s	35.00
9	401.000	(f)	44.750	23.500	168s	35.00
10	401.000	(f)	44.750	23.500	168s	35.00
11	401.000	(f)	44.750	23.500	168s	35.00
12	401.000	(f)	(e)	(e)	(e)	35.00
14	401.000	(f)	44.750	23.500	168s	35.00
15	401.000	(f)	44.750	23.500	168s	35.00
16	401.000	(f)	44.750	23.500	168s	35.00
17	401.000	(f)	44.750	23.500	168s	35.00
18	401.000	(f)	44.750	23.500	168s	35.00
19	401.000	(f)	(e)	(e)	(e)	35.00
21	401.000	(f)	44.750	23.500	168s	35.00
22	401.000	(f)	44.750	23.500	168s	35.00
23	401.000	(f)	44.750	23.500	168s	35.00
24	401.000	(f)	44.750	23.500	168s	35.00
25	401.000	(f)	44.750	23.500	168s	35.00
26	401.000	(f)	(e)	(e)	(e)	35.00
28	401.000	(f)	44.750	23.500	168s	35.00
29	401.000	(f)	44.750	23.500	168s	35.00
30	401.000	(f)	44.750	23.500	168s	35.00
31	401.000	(f)	44.750	23.500	168s	35.00
			AVERAGES FOR MONTH			
Aug.	401.000	...	44.750	23.500	....	35.00
			AVERAGES FOR WEEK			
Aug. 2	401.000	...	44.750	.....	....	.....
9	401.000	...	44.750	.....	....	.....
16	401.000	...	44.750	.....	....	.....
23	401.000	...	44.750	.....	....	.....
30	401.000	...	44.750	.....	....	.....

Calendar week averages, New York Silver: Aug. 5th, 44.750; 12th, 44.750; 19th, 44.750; 26th, 44.750.
(e) Not quoted (Saturday). (f) No quotation.

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

(b) Export prices are net at refineries on the Atlantic seaboard and include sales of domestic copper in the foreign market. Owing to the World War and the disruption of normal trade relations, our export copper quotations, since September, 1939, have been based largely on f.a.s. transactions, ex United States ports. We deduct .05c. from the f.a.s. basis (lighterage, etc.) to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

(c) Silver other than newly-mined domestic, by Handy & Harman. Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotations on newly-mined domestic silver, 999 fine was 70⅝c. throughout August.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold in domestic and imported ore or concentrate is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

and 70,000 tons, of which about 32,000 tons came from foreign sources, chiefly Mexico. Production of refined lead in July amounted to 33,434 tons from domestic sources and 7,037 tons from secondary and foreign material, a total of 40,471 tons. This compares with a total of 45,496 tons in July last year.

Though production of zinc in this country has been declining, the drop has not been sufficient to offset the reduction in the demands of consumers. The July statistics of the American Zinc Institute placed stocks at 234,949 tons, which compares with 224,953 tons a month previous and 125,030 tons a year ago. August zinc statistics are expected to reveal another gain in stocks.

Production of magnesium from primary sources during May amounted to 34,308,000 lb., against 37,846,000 lb. in April, the WPB reports. Output for May was down 18 percent from the peak established in January of the current year.

The Government's buying agent has offered to purchase No. 1 and No. 2 sheet mica from domestic producers on a full-trim basis of $8 per pound.

Miscellaneous Metals Monthly Averages

Average prices of miscellaneous metals for June and July.

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average producers' and platers' quotations, (e) Special shapes sold to platers.

	July	Aug.
Quicksilver, N. Y. flask	100.560	104.037
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35.000	35.000
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum ingot	15.000	15.000

E & M J Price Index

Weighted index of non-ferrous metal prices (copper, lead, zinc, tin, silver, nickel, and aluminum). The average for the years 1922-1923-1924 equals 100.

1929	110.33	1936	73.45
1930	82.87	1937	90.86
1931	60.20	1938	73.67
1932	48.26	1939	77.71
1933	59.79	1940	79.22
1934	69.59	1941	83.49
1935	74.66	1942	86.80
		1943	88.74

	1942	1943	1944
January	85.39	88.74	88.74
February	85.90	88.74	88.74
March	85.90	88.74	88.74
April	85.90	88.74	88.74
May	85.90	88.74	88.74
June	85.90	88.74	88.74
July	85.90	88.74	88.74
August	85.90	88.74	88.74
September	88.74	88.74	.....
October	88.74	88.74	.....
November	88.74	88.74	.....
December	88.74	88.74	.....

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated
(Sept. 1, 1944)

MISCELLANEOUS METALS

Aluminum, ingot, 99 plus per cent, lb.	15c.
Antimony, domestic, spot, lb. 5 tons or more	15.839c.
Bismuth, ton lots, lb.	$1.25
Cadmium, commercial sticks, lb.	90c.
Calcium, lb., ton lots, 97 @ 98 per cent	$1.25
Chromium, 97 per cent grade, lb.	89c.
Cobalt, 97 to 99 per cent, per lb.	$1.50
Indium, troy oz.	$7.50@$8.50
Nickel, electrolytic cathodes, lb.	35c.
Magnesium, 99.8 per cent, carloads, lb.	20½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation) troy oz.	$35.00
Quicksilver, flask of 76 lb., 100 flasks or more	$105.00
Selenium, 99.5 per cent, lb.	$1.75
Silicon, minimum 97 per cent, spot, carloads, lb.	14.75c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50 nom.
Titanium, 96 to 98 per cent, lb.	$5.00

METALLIC ORES

Beryllium Ore, 8 to 12% BeO, f.o.b. mine, per unit	$14.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry, 48% Cr_2O_3, 2.8 to 1 ratio	$41.00
48% Cr_2O_3 3 to 1 ratio	$43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$4.75
Mesabi bessemer	$4.60
Old Range non-bessemer	$4.60
Mesabi, non-bessemer	$4.45
Lead (Galena) 80 per cent, Joplin, Mo., ton	$76.01
Manganese, Metals Reserve Co. sales price, per long-ton unit of Mn contained, 48 per cent, subject to premiums and penalties, effective May 15, 1944: 85c. (duty paid) New York, Philadelphia, Baltimore, Norfolk, Mobile, and New Orleans; 91c., Fontana, Calif., Provo, Utah, and Pueblo, Colo.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Chinese, 60 per cent, duty paid	$24.00
Domestic, 60 per cent and upward	(a) $24.50
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27½c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton	$55.28
(a) Prices at mines, small lots, usually several dollars less.	

METALLIC COMPOUNDS

Arsenious Oxide (arsenic) lb.	4c.
Cobalt Oxide, 70 @ 71 per cent, lb.	$1.84
Copper Sulphate, 100 lb.	$5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be	$15.00
Ferrochrome, 65 @ 70 per cent per pounds of Cr contained.	13c.
Ferromanganese, 78 @ 82 per cent, gross ton	$135.00
Ferromolybdenum 55 @ 65 per cent Mo. lb. of Mo. contained	95c.
Ferrosilicon, 50 per cent, per lb. of contained Si	6.65@8.10c.
Ferrotungsten, 75 @ 80 per cent, lb. of W contained	$1.90
Ferrovanadium, per lb. of V, delivered	$2.70@$2.90
Silicomanganese, 1 per cent C, gross ton	$133.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$650@$758
Crude No. 2	$165@$385
Spinning fibers	$124@$233
Paper stock	$44@$49.50
Shorts	$14.50@$26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	$62.50@$65.00
Paper stock	$44.00@$53.00
Shorts	$14.50@$28.50
Floats	$19.50
Barytes, long ton:	
Georgia, crude	$8.50@$9.00
Missouri, 93 to 94 per cent Ba SO_4	$8.25@$8.50
Bauxite, long ton:	
Domestic, crude, 50 @ 52 per cent (not dried)	$5.00
Domestic, chemical, 55 @ 58 per cent	$7.50@$8.50
Domestic, abrasive, 80 @ 84 per cent	$16.00
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	$6.75@$8.00
Delaware, No. 1	$15.00
Feldspar, bulk, ton:	
Potash feldspar, 200 mesh	$17.00
Glass-spar, white, 20 mesh	$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois 85–5 per cent, all rail movement, ton	$33.00
Acid 98 and 1 per cent, bulk, ton	$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$22.00
Mica—Colonial Mica Corp., agent for Metals Reserve Co., offered to buy No. 1 and No. 2 domestic sheet mica, 1½ and 2 in. and larger, full trim, at $8 per pound from Aug. 7 to Dec. 31, 1944. Those who wish to sell on a three-quarter trim basis will obtain $6 per pound, as previously stated.	
Ocher, Georgia, ton	$19.00@$22.00
Pyrites, Spanish, per long ton unit of S, c i f, Atlantic ports	12c. nom.
Silica, in bags, 325 mesh, ton	$20.00@$40.00
Sulphur, Texas, mines, long ton	$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	$12.00@$15.00
Vermont, extra white, 200 mesh	$9.50@$10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50
200 mesh, cream colored	$26.00

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$23.50
Steel, base price, Pittsburgh Billets, gross ton	$34.00
Structural shapes, 100 lb.	$2.10

WASHINGTON REFLECTIONS

McGRAW-HILL WASHINGTON NEWS BUREAU

Tin Supply Requires Strict Conservation

The stockpile of tin is slowly declining. Evidence is to be seen in the recent appeal for collection and salvage of used tin cans made by Erwin Vogelsang, Director of the Tin and Lead Division of WPB. This appeal is directed at householders, but it serves to remind the trade that the tin can seems destined to be an important source of tin for some time.

It is expected that the drive to salvage tin cans will be pushed until the end of hostilities if not longer. It was first thought that electroplating would result in a rapidly declining yield of tin from cans, but this has not proved to be the case. There continues to be a great quantity of cans made using dip coatings.

U.S. Tariff Report Favors Conservation of Mercury

In a report on mercury prepared at the request of the Senate Committee on Finance and the House Committee on Ways and Means, the United States Tariff Commission observes:

"During the decade that preceded the war the domestic mercury industry supplied about two-thirds of the United States consumption. After a period of postwar readjustments, a return to the former relationship between domestic and foreign metal in the United States markets may readily occur, with possibly some decline in the share furnished by the domestic industry."

Conservation of domestic mercury resources is advocated in the report, and the Commission's findings state that even at the prewar rate of domestic production, the average grade of ore has steadily declined. This decline led to the belief, held by some authorities, that the mercury deposits in this country may soon be exhausted. Increased use of these limited reserves during the present war emergency has been unavoidable, it is pointed out. In peacetime, however, a policy that would encourage their rapid exhaustion and thus weaken our position from the standpoint of future national defense and also expose us to the possible exactions of a foreign mercury cartel, would appear unwise, the authors of the report state. In these circumstances, they add, the extent to which operation of the mercury mines should continue after the war seems to depend on the extent to which operation is essential in order to provide reasonable operating facilities which could be readily expanded when needed for national security. Beyond this point, it is recommended that measures tending to hasten the exhaustion of our limited resources should be avoided.

Production in the United States increased to 53,500 flasks in 1943, owing to wartime demands and a substantial increase in the price. In 1939, domestic output was 18,633 flasks.

The Tariff Commission's report on mercury is the first of a series on "War Changes in Industry."

Senate Passes Bill for Mineral Stockpiling

Considering the adverse tone of its report (*E.&M.J.*, Aug., p. 103) issued in late July, it was something of a surprise when, in mid-August, the surplus property subcommittee of the Senate committee on small business (Senators Stewart, Murray, and Taft) introduced a surplus property disposal bill (S.2065) which provided for unqualified freezing of all government-held stocks of war-essential minerals, including scrap, as a national defense reserve.

The bill was referred to the Senate Committee on Military Affairs, before which Surplus Property Administrator Clayton and a War Department representative opposed the stockpiling provision. After a colloquy between the chairman, lame-duck Senator Reynolds (N.C.), and Clayton, in which the latter disclosed that the United Nations were using three million tons of copper per year, the committee voted to retain the provision.

The bill reached the Senate floor Aug. 21 and was debated and passed during the same week, still retaining the stockpiling feature. There was little opposition, except from Senator George, who criticized it bitterly as a mining industry bill which would deny important materials to reconverting industry and thus handicap the re-employment of war workers.

Late in August the bill was slated for a conference committee, as the House had previously passed the Clayton-approved Colmer bill, which contained no special mineral stockpiling provisions and left such matters up to the discretion of the Surplus War Property Administrator. The conference committee might retain the stockpile provision or might knock it out entirely. A likely compromise would provide for retaining such mineral inventories as the armed forces approved, and leave disposal of any remainders to SWPA.

It is conceivable that such a compromise might be nearly identical in actual effect with the Senate version. As discussed in *E.&M.J.* several months ago (July 1943, p. 73), a military stockpile adequate for the needs of a future total war might be as much as six peacetime years' supply. It is doubtful if any present government-held stocks, including what is potentially available from military junk and battlefield scrap, will exceed these amounts. However, it is also evident that no serious attempt to size up the nature and volume of future war needs has been made. Also, if other powerful nations should attempt stockpiling on a similar scale, aggregate demands for this purpose might have fantastic effects on prices and peacetime usages.

Leith Denies Knowledge of Mineral Conference

With reference to the report (*E.&M.J.*, July, p. 102) that the Administration will conduct an international conference on postwar control of minerals, with Dr. C. K. Leith prominently mentioned, Dr. Leith advises that he is unaware of any such plans. As a private citizen, apart from his official connection with WPB, he is canvassing industry views on postwar foreign policy affecting minerals, with a view to assisting the State Department. The Brookings Institution is cooperating in the investigation.

Bill to Extend Scope of RFC Mine Loans

Senators Murray (Mont.), Hayden (Ariz.), and Scrugham (Nev.) introduced a bill in mid-August amending Section 14 of the Reconstruction Finance Corporation Act, that would authorize loans for the purpose of development, rehabilitation, and operation of gold mines and other mining properties, the operation of which ceased or has been curtailed by WPB Limitation Order L-208, as amended, or any other government restriction. The bill provides that the total amount to be made available for loans under the amended measure is not to exceed $25,000,000. Loans are to be made under terms and conditions determined by RFC, according to the proposed amendment.

Import Controls on Four Minerals Are Removed

Effective Aug. 19, the War Production Board canceled federal control over imports of lead, fluorspar, beryllium, ilmenite, and tin (except tinplate scrap). Control had been applied through General Imports Order M-63.

Announcement had been made that import control over antimony would also be removed, but this provision was canceled on Aug. 19.

Government Behind on Reconversion Policy

Up to the first of September the four reconversion orders promulgated by Donald Nelson (*E.&M.J.* Aug., p. 102) were the only moves that had been made to ease the industries of the nation over the rough road that will be encountered with the defeat of Germany which appears to be at hand.

Donald Nelson warned that war production would be cut an estimated 40 percent with the fall of Germany and that labor released from the war plants must be used in the civilian economy following the inevitable cancellation of war orders. The Washington interpretation of the situation is that firms should take aggressive action to secure authorization from the military forces and manpower authorities for reconversion.

Requests of this nature can now be made with perfect propriety, as the armed services can refuse to permit the reconversion. Considering General Somervell's statement that we should attain maximum production on the day that the last shot is fired in the European war, plus the fear of the services that reconversion psychology will be infectious, there seems small likelihood of impressive military cooperation on reconversion until X-day.

WPB in Turmoil Over Nelson-Wilson Quarrel

In late August a situation which had been simmering in top levels of WPB for months suddenly exploded with the resignation of Charles E. Wilson, executive vice-chairman. Wilson announced his exit at a meeting of WPB policy-making executives immediately after Chairman Nelson had stated that there was no substantial discordance of views between Wilson and himself. At a later press conference Wilson bitterly criticized Nelson for weeks of delay in quelling rumors of differences between them and for permitting satellites to circulate snide stories about Wilson, including the inference that he was a big-business tool.

This result was all the more surprising because for weeks Wilson and the other WPB vice-chairmen who had opposed Nelson's steps toward reconversion had been telling friends that the differences were over details, not fundamentals, and involved methods rather than objectives. The Army and Navy and the overruled vice chairmen were represented as extremely desirous of aiding reconversion, but fearful of taking steps that might arouse war workers' consciousness of the impermanence of their jobs.

The explosion took place after a week of confused speculation following the announcement that Nelson was going to China for a long stay and Wilson would direct WPB in his absence. This announcement was generally interpreted as meaning that Nelson was being "kicked upstairs" and that WPB reconversion policy would be brought in line with the Wilson-Army-Navy viewpoint. To quiet this rumor, the President issued a statement that WPB policy would not be altered by Nelson's absence.

After Wilson's resignation, 37-year old Lieut. Commander J. A. Krug was made acting WPB chairman, Nelson departing for China. A day later the situation was further confused by the President's statement that he was uncertain if Nelson would return to WPB.

At month's end Washington was still seething with speculation over what was behind the scenes in this affair. Members of Congress were showing interest in ascertaining Krug's views. Other impending resignations of vice chairmen were rumored, including that of Arthur H. Bunker, deputy executive vice chairman.

Restrictions on Cadmium Lifted for Minor Uses

Easing of certain restrictions on the use of cadmium in the face of the alleged shortage of that metal is not as peculiar as it might seem. The controlling order as amended in August permits additional uses for low-melting-point alloys containing cadmium. The amount of metal involved is exceedingly small, and the need for the fuses, gages and fire-control apparatus for which the alloys are used is great. The recent very sudden increase in cadmium requirements is due to military use, the nature of which is highly confidential.

The circumstance that the war might possibly take a turn which would draw heavily on cadmium supplies explains the concern over cadmium indicated in the release describing the smelter subsidy for Tri-State concentrates (*E.&M.J.*, Aug., p. 102). Considering the amount of cadmium stockpiled, trade circles had expressed skepticism over the expressed need for stimulating cadmium production.

More Cutbacks in Aluminum and Magnesium

Continued surpluses of magnesium and aluminum resulted in cutbacks in production of both metals the first of August. Once the decision was made to reduce production, manpower considerations determined where the cuts should be made. Production costs will determine where future cuts in production will be made, since the labor shortage will be a thing of the past with the fall of Germany.

The decision to bring the production of magnesium more closely in line with requirements simply acknowledged an accomplished fact, as labor shortages already had curtailed operations at the plants involved. Reduced schedules in four magnesium plants, with a complete termination of operations of a fifth, were announced July 30. Scheduled monthly production of magnesium was reduced 7,517,000 lb. as a result of this action. The plants were all government-owned. This was in keeping with the announced policy of the War Production Board that government-owned plants would be closed or their operations reduced before the plants of private industry.

COMPANY	*Monthly Production (Hundreds of Pounds)* *Previous*	*New*
Dow Magnesium Corp., Marysville, Mich.	3,600	0
Dow Magnesium Corp., Velasco, Texas	6,600	6,000
Magnesium Reduction Co., Luckey, Ohio	1,050	833
Electro Metallurgical Co., Spokane, Wash.	2,300	1,200
Basic Magnesium, Inc. Las Vegas, Nevada	6,500	4,500

The first three plants employed the Dow electrolytic process, the first on underground brines and dolomite, the second on sea water, and the third on dolomite.

The cutback in aluminum production resulted in the complete termination of operations at Riverbank, Calif., Burlington, N. J., and at the Torrance plant, in Los Angeles, also reduced production at Jones Mill, Ark.; Spokane, Wash., and Troutdale, Ore. Monthly production has been cut 30,000,000 lb. by this action. In addition, Alcoa is reducing production at its Alcoa, Tenn.; Badin, N. C.; Massena, N. Y., and Vancouver, Wash., plants by 18,000,000 lb. per month. Also, imports from Canada have been sharply reduced and delivery of 125,000 tons of Canadian metal under contract has been indefinitely postponed.

International Survey of Minerals by U.S.B.M.

As the first discussions of peace plans of the United Nations were getting under way at Dumbarton Oaks, in Washington, the work being done in the Bureau of Mines to compile information on strategic minerals assumed increased importance. It is expected that the information gathered can be used in the formulation of a national mineral policy in the postwar period. This would mean that it will also be basic information for the peace conference.

The work consists of the determination of the mineral resources of the world by countries. It covers the national policies of each country which pertain to minerals. Such information is included as the nationality of control of individual minerals, and details on the principal sources from which the United States imports its needs. The work covers an analysis of reserves, production costs, and other subjects in great detail. At the moment the findings are considered confidential information and are not available to the public.

NEWS OF THE INDUSTRY

Western States Confer in San Francisco On Postwar Problems—Attendance Large

Governors of eleven Western states and South Dakota sent delegates to a conference held in San Fransisco on Aug. 10 and 11 at the invitation of Governors Warren of California and Carville of Nevada. P. R. Bradley presided; W. W. Mein, Jr., and J. A. Carpenter were secretaries. The need for immediate action to provide for the postwar emergency was stressed in keynote addresses by Governors Warren and Carville. Several hundred mining men attended the opening lucheon.

Gold Production

In the opinion of the conference, WPB Order L-208, closing down gold mines, never accomplished its purpose of diverting manpower and materials into strategic metal mines, and consequently should be rescinded immediately to permit gold mines and dredging operations to prepare for postwar employment. As this industry provided business and employment in numerous counties of all the states represented, it was demanded that WPB, WMC, and OPA cease discriminatory references to gold mining as a "non-essential industry," and further mentioned that the industry should be accorded "a fair share of labor certifications and material priorities necessary to permit operation under existing limitations of Order L-208."

Because American producers cannot participate in the present outside markets at gold prices varying between $40 and $80 per ounce, it was recommended that the President and the Secretary of State "enter into such negotiations as will make free markets for gold in foreign countries available to American gold producers, and will remove current legal restrictions on the export of newly mined gold to such markets."

Monetary Policy

It was advocated that gold and silver be used in the International Bank and International Fund proposed at the Bretton Woods Conference. The belief was expressed that the American people are in favor of a sound monetary policy in contrast to "managed currency" or currency "debased by an international group of experts."

Stockpiling and Prices

To prevent stagnation of the mining industry and attendant unemployment, it was urged that stockpiles of strategic metals and minerals be "frozen" at the close of hostilities; that reverse lend-lease purchases of metals and minerals be added to such stockpiles; and that "these reserves of critical or strategic minerals and metals be kept inviolate for future war emergencies and must not be released except by Act of Congress."

The continuance of higher-than-normal metal prices and premiums was advocated until operators could recover their capital investment. It was suggested that present prices and premiums be extended until July 31, 1946, but in no event should such prices and premiums be in effect longer than one year after the cessation of hostilities.

Tariff

Tariff reductions on minerals and metals were opposed and, in certain instances where employment would be increased, the imposition of moderate tariffs or increases were recommended.

Mine Finance

In the interests of mine finance it was recommended that a central publicity committee be established by the 12 Western states to encourage investment by advertising the importance of the industry to the nation; that a state governor's conference of operators, underwriters, and representatives of SEC be called to modify objectionable regulations governing the sale of securities; and that RFC provide loans "for the purpose of rehabilitation of mines closed under Order L-208."

Revised Back-Pay Orders

Owing to undue hardships which have been inflicted upon the mining industry by NLRB, FWA, and WLB by the imposition of retroactive back-pay orders, the conference recommended that a limitation of six months from dates of orders be placed by law upon the right of these tribunals to impose retroactive back-pay orders. It is thus contended that "mine operators will be protected by such limitation against confiscatory administrative orders which the courts have generally refused to modify even when violations of the labor laws may have been found which were unintentional, or made in good faith reliance upon a construction of the statutes or regulations at variance with subsequent administrative interpretation."

Taxation

Admitting the necessity for heavy postwar taxation, the conference recommended that Federal income tax laws be revised to provide revenue without discouraging investment; that the excess profits tax and capital stock tax be quickly repealed; that adequate depletion allowances be retained in any revision of tax laws; and that a 15 percent ceiling rate be provided in the case of long-term capital gains concurrent with the removal of present limitations on capital losses.

Public Land Policy

Strong disapproval was voiced against the policy of the General Land Office in "initiating proceedings to have mining locations held void for lack of discovery, where made on unreserved public domain by locators who believed in good faith that they contain valuable metals in minable quantities" and have been prevented by the war or other conditions from perfecting their discoveries. Amendment of the Taylor Grazing Act to prohibit such contests by GLO was recommended.

Defense Plants Disposal

The orderly transition of government-owned war plants to private ownership and operation was favored by the conference provided such transition could be made on a sound economic basis and without interfering with national security. In the absence of favorable opportunities for outright sale, it was contended that plants and equipment should be leased until improved conditions for sale prevailed.

Other Proposed Action

It was advocated that freight rates remain under the jurisdiction of the Interstate Commerce Commission and numerous state regulating authorities. The public roads bill now before Congress was endorsed. Duplication of functions by state and federal bureaus was criticised. It was suggested that the functions of the USBM and USGS be sharply defined. A Congressional act was proposed which would make geologic and engineering reports compiled during the war at government expense available to each state.

Canadian Gold Mines Report Labor Shortage

A report on mine labor based on a survey made of the gold mining industry in Canada last year indicates that a substantial increase in the number of miners will be necessary to keep many of the producers in operation. National Selective Service has moved some gold mines ahead from C to B classification in an attempt to fill immediate labor requirements. The situation has been steadily growing more critical.

In the first half of 1944 the number of gold mine employees fell 20 percent, compared with a 21.7 percent drop in gold output from Ontario mines. Canadian gold mines employed 16,207 men in January 1944, compared with 26,030 men in January 1943, and 32,551 men in 1939. From 1939 to the end of 1943, average yearly wages of gold miners increased 14.6 percent, from $1,782 to $2,041. Maximum gold recovery was secured in 1941, amounting to 5,345,178 oz. from 19,026,273 tons of ore milled. In 1942, tonnage was cut to 16,820,442. The decline continued through the first half of 1944, to result in the lowest rate recorded in 15 years.

Planes of United Nations Carry Vital Minerals

Strategic minerals and metals comprised a substantial part of the 22,000,000 lb. of cargo carried by planes of the United Nations from remote parts of the world during the first six months of 1944, according to a recent report compiled by OWI.

Tin, mercury, mica, and tantalite were flown "over the hump" from interior China to Indian ports to be shipped by boat to the U.S. Several million pounds of mica have been boxed in Bihar, India, sent by fast passenger train to Karachi, and flown to the U.S. and the United Kingdom during the past two and one half years. The main route from India to U.S. crosses Africa by way of Khartoum and Accra and terminates in either Maimi or New York.

Quartz crystals, beryllium ore, mica, and tantalite were flown to the U.S. from mining areas of Brazil. In some instances fewer than 36 hours were required to carry air cargoes containing tantalite and mica plates from Australia to San Francisco. Russia received air shipments of mercury from India and sent platinum to the U.S.

Small Mine Operators Testify at Phoenix

Arizona small mine operators aired their viewpoints on postwar problems at a hearing held by the U. S. Senate Mining and Milling Subcommittee of the Senate Small Business Committee at Phoenix, Aug. 7. Senator James G. Scrugham, chairman of the subcommittee, who was detained in Washington on senatorial business, delegated William C. Broadgate, the committee's technical consultant for mining legislation, to conduct the hearing.

A resolution was presented by Frank Perry, of the Globe-Miami Chapter of the Arizona Small Mine Operators Association, urging the government to aid operators during the readjustment period by "freezing" stockpiles at the close of hostilities and by purchasing more minerals and metals. Testimony was introduced stating the need for postwar tariff on metals and suggesting that the price of copper be set at 17 c.

Dr. Wilbur E. Nelson, of the War Production Board, explained that Order L-208, closing gold mines, would be relaxed wherever operators could show that manpower not necessary to the war effort was available. He did not intimate that L-208 would be rescinded in the near future.

Mr. Broadgate revealed that Senators Scrugham, Murray, and Hayden were sponsoring a bill which proposed modification of section 14 of the Reconstruction Finance Corporation Act and would authorize the corporation "to make loans for the purpose of making accessible, examining, or developing mine workings, and to mine, mill, or smelt ores, including loans for the rehabilitation and operation of gold mines, or other mines the operation of which has ceased or has been curtailed by WPB Limitation Order L-208." The bill would further authorize the corporation to "receive and process applications for loans "regardless of closing orders, and to make loans available to applicants immediately upon withdrawal of such orders.

Mr. Charles Willis, secretary of the Arizona Small Mine Operators Association, in summarizing the discussion added that SEC's sphere should be restricted to enterprises involving stock sales of more than $100,000.

Pageant to Inaugurate El Paso Mining Event

International Mining Day will be held in El Paso, Tex., Nov. 10 and 11 for mining men of the entire Southwest and Mexico. In projecting this event, the Chamber of Commerce is trying to re-establish El Paso as the mining "capital" of the Southwest, and is planning to stage a pageant that will center around a mining theme. A "sourdough" dance will be staged. A mining equipment exhibit is planned.

United States Copper Statistics

In Tons

	U. S. Production (a) Crude	U. S. Production Refined	Deliveries to Customers (b) Domestic	Deliveries to Customers Export	Deliveries to Customers Total	Refined (c) Stock
1939	836,074	818,289	814,407	134,152	984,559	159,485
1940	992,293	1,033,710	1,001,886	48,537	1,050,423	142,772
1941	1,016,996	1,065,667	1,545,541	307	1,545,848	75,564
1942	1,152,344	1,135,708	1,635,236	.....	1,635,236	65,309
1943	1,194,699	1,206,871	1,643,677	.....	1,643,677	52,121
Jan. 1944	95,424	92,781	101,779	.....	101,799	45,800
Feb. 1944	95,713	87,128	124,532	.....	124,532	36,489
Mar. 1944	101,289	99,118	156,083	.....	156,083	37,259
Apr. 1944	92,779	95,280	155,877	.....	155,877	38,382
May 1944	94,624	98,580	165,714	.....	165,714	37,074
June 1944	(d)89,102	93,958	140,932	.....	140,932	42,467
July 1944	85,734	93,650	121,705	.....	121,705	48,050

Source, Copper Institute. (a) Mine or smelter production or shipments, and custom intake including scrap. (b) Beginning March, 1941, includes deliveries of foreign copper for domestic consumption. (c) At refineries, on consignment, and in Exchange warehouses, but not including consumers' stocks at their plants or warehouses. (d) Corrected.

Cheap Peruvian Power May Attract Industry

Availability within the next 18 months of a large block of firm electric power at around 2 mills per kilowatt-hour at Chimbote, Peru, the best port on the Pacific side of South America, is understood to have attracted the attention of various proposed electro metallurgical projects. No contracts for this purpose have been made, but it is reliably reported that at least one is under serious consideration by a mining company long established in Peru.

Power will be produced by a hydroelectric project financed and built by the Peruvian government. The $5,000,000 required has been set aside and the undertaking is about 20 percent completed. Machinery and equipment necessary to complete construction are expected to be shipped from this country in the near future.

Located in a rugged canyon 85 miles inland from Chimbote, the hydroelectric project will utilize water from a stream fed by glaciers on a 22,600-ft. mountain in the high Andes. By diverting a stream, with a minimum flow of around 1,200 cu. ft. per second, through a 5.7-mile tunnel in solid granite, a head of about 1,350 ft. is obtained.

Several conditions contribute toward the development of power at low cost. No storage reservoirs are necessary, there are no property damages, and good labor is available at low wages. Excellent solid granite of uniform character also permits use of an unlined tunnel.

Barton M. Jones, an American, is engineer-manager of the project. David Dasso, a Peruvian engineer who was educated in this country, heads a government organization in charge of the undertaking.

WPB Orders Modify NMC Wage Grants

Non-ferrous Metals Commission orders which had granted a 25c.-per-shift general wage increase to approximately 30,000 non-ferrous metals workers in seven Western states were modified on Aug. 28 by WLB directive orders which granted premiums of 4c., 6c., and 8c. per hour to employees actually working nights.

The Commission had granted the general wage increase to compensate employees for the burden of working nights on the basis that all of them shared night work "in one way or another." The Board, however, found that approximately one-third of those involved worked steadily on day shifts and thus were not entitled to any premium for night work.

The Board's directives established the 4c. and 8c. premiums for work done on the second and third shift, respectively, in mills, smelters, and refineries. The 6c. premium was provided for mine work done on an intermediate shift which was later than the usual second shift but earlier than the

(*Continued on next page*)

third shift. It was stipulated in the orders that the premiums would not be put into effect until approved by the Economic Stabilization Director.

Approximately 30 companies operating in Utah, Colorado, Montana, Arizona, New Mexico, Nevada, and Idaho, as well as various locals of the CIO, AFL, and Railroad Brotherhoods, were involved in disputes which were settled by the WPB directive orders. Industry members dissented on the bonus as such, and labor members dissented on the amount granted.

In the Utah cases the union's demand for elimination of physical examinations and X-rays had been denied by the Commission, which directed instead that results of examinations should be made available to the persons examined. The Board directed that the parties negotiate a plan to remove the possibility of discrimination in the companies' use of physical and X-ray examinations. If disagreement should ensue, the matter would be referred to a NMC hearing.

In the Anaconda cases the Board upheld the Commission's granting of two weeks' vacation after five years of service, but directed that the pay allowed should be based on the employee's straight-time earnings instead of his average earnings as directed by the Commission. By Board order the sections of the Commission's directive which define continuous service and eligibility for the two-week vacation were returned to the parties for negotiation because the current clause barred, in effect, a worker who failed to work 75 per cent of the available shifts in any one of the last five years. The same vacation provisions were ordered by the Board in the case affecting Phelps Dodge operations at Morenci and Douglas, Arizona, and Tyrone, New Mexico, and the International Union of Mine, Mill and Smelter Workers.

Dr. Dow Urges Removal Of Magnesium Controls

In an open letter to Donald M. Nelson, chairman of the War Production Board, Dr. Willard H. Dow, president of the Dow Chemical Co., charged that the government was promoting future unemployment by refusing to remove its controls over magnesium. He stated that Order M-2-b, which had "been represented to the public as removing controls over magnesium," did not modify control of the industry in essential respects. As supporting evidence of this he mentioned the continued allocation of ingot magnesium.

The demand for immediate removal of controls was later reiterated in Dr. Dow's address to the stockholders of the Dow Chemical Co., Aug. 23, when he pointed out that the necessity for controls would cease at the close of the war. He urged that regulations should therefore be dropped as fast as possible in order to prevent shock to the industry resulting from a sudden and complete withdrawal of controls. He concluded that not until every control is removed "can we have the free, open and competitive market in which the customer rules."

At the same meeting Dr. Dow reported that the sales of the company for the fiscal year ended May 31, 1944, were $85,500,000 above those for the fiscal year of 1940. A comparison between the operations of 1940 and 1944 showed a sales increase of 218 percent, a wage increase of 299 percent, and a Federal tax increase of 704 percent. Dividend payments were the same for both years.

Industrial Hygiene Group To Meet in Pittsburgh

The ninth annual meeting of the Industrial Hygiene Foundation, an association of industries for the maintenance of healthful working conditions, will be held at Mellon Institute, Pittsburgh, on Nov. 15 and 16. The program, geared for management, will consider sickness in industry and problems connected with sick absenteeism which call for postwar solutions. Continued consideration will be given to "Putting the Disabled Veteran Back to Work."

Magnetite Disclosed by Drilling at Bourbon, Mo.

The presence of a large body of magnetite beneath Bourbon, Mo., and extending for some distance south and west, has been indicated by drilling operations conducted for the government under the direction of W. D. McMillan, of Rolla, Mo., engineer for the Missouri-Oklahoma-Kansas district of the U.S. Bureau of Mines. Mr. McMillan reports that the field appears to be about a mile and a half by three-quarters of a mile in size and that the ore is similar in quality to that found at Iron Mountain, Mo.

Presence of the local deposit was first disclosed about 12 years ago in the course of a magnetic survey conducted by the Missouri Bureau of Geology and Water Resources. Drilling was begun last October under the terms of an appropriation by Congress to discover new sources of war materials. The exploration operations are expected to take another three months. Should the complete studies indicate iron of sufficient quantity and quality to justify industrial development, a large mining company is expected to move into the field. Development probably will entail an expenditure of $1,000,000 or more.

Union Petitions to Remove Check-off

The National War Labor Board issued a directive order eliminating check-off provisions at the request of the International Hod Carriers, Building and Common Laborers Union, AFL, representing some 450 employees of the Diamond Magnesium Co. at Fairport, Ohio. The union, which was certified as the sole bargaining agent in May, 1943, asserted that "it did not want the check-off because it wanted to maintain its bond of friendliness with the members."

North Carolina Seeks Sponge Iron Pilot Plant

Because of successful experiments conducted in sponge iron at Salisbury, N. C., the State of North Carolina has asked the United States Bureau of Mines to install a pilot plant in Rowan County capable of producing daily from 15 to 25 tons of iron sponge.

Indorsing recommendations by State Geologist Jasper L. Stuckey, Governor J. M. Broughton in a letter to Dr. R. S. Dean, assistant director of the U. S. Bureau of Mines, asked that the experiments be continued on a larger scale, that a pilot plant be set up, that experienced engineering service be made available to operate the plant, and that the work be continued until all different types of iron ore in the State have been tested and the "true costs of producing sponge iron from them have been determined."

Experiments conducted by Stuckey, the Governor said, have shown that ore produced from the Cranberry Mines in Avery County, N. C., could produce the best sponge iron in the United States, and reports from Stuckey were cited showing that the experiments which began at the Isenhour Brick and Tile Co. at Salisbury produced a reduction of 99.4 percent, an iron content of 96 to 98 per cent, a sulphur content of 0.017 percent, and no other impurities.

Fluorspar Restrictions Lifted by WPB

All restrictions governing the purchase and sale of metallurgical fluorspar have been lifted by the War Production Board as a result of increased production and more economical use by consumers. The Restricted Shipping Plan, which provided for equitable distribution of the fluorspar supply since Jan. 1, 1943, has been discontinued.

Consumption and consumers' stocks of fluorspar in June this year, by industries, in tons, as reported by the Bureau of Mines:

	Consumption	Stocks
Steel	18,335	60,853
Hydrofluoric acid	10,446	32,657
Glass	2,463	5,773
Enamel	233	943
Magnesium	392	1,263
Aluminum	(a)141	743
All other	1,326	5,948
Totals	33,246	108,180

(a) Used as flux in reduction plants. Fluorspar consumed in making artificial cryolite and aluminum fluoride is included under hydrofluoric acid.

Production of fluorspar during June was 34,965 tons, which compares with 36,529 tons in May. Production during the first half of 1944 was 207,899 tons, with consumption at 203,428 tons. Stocks on June 30 totaled 136,894 tons.

PERSONAL NEWS

Alvin W. Knoerr has joined the editorial staff of *Engineering and Mining Journal*. He has been employed intermittently with the Sunshine Mining Co., Kellogg, Idaho, since 1937, where he served as mine laborer, mining engineer, and structural and mechanical designer for surface and underground installations. For two summers he worked at the Climax Molybdenum Co., Climax, Colo., as student miner and chute blaster. After completing preliminary engineering courses at the University of Wisconsin Extension Division, Milwaukee, and at the Wis-

ALVIN W. KNOERR

consin Mining School at Platteville, Mr. Knoerr received the bachelor's degree in mining at the Missouri School of Mines, Rolla, Mo., in 1938 and the engineer of mines professional degree in 1941. On two occasions he interrupted his field work to instruct in the mathematics, physics, mining, and drafting departments of the Wisconsin Institute of Technology at Platteville.

James Marcum, who has been employed as a mill shifter by Castro Chrome Associates, of San Luis Obispo, Calif., for the past 22 months, at the company's 120-ton daily capacity concentrating mill, will join the Armed Forces early in September. He plans to operate a gold property in Arizona after the war.

Dr. L. A. Fox, metallurgist at the Salt Lake City station of the Bureau of Mines, has been appointed head of the new office of the Bureau at North Carolina State College, where a mineral development program for the southern states will be inaugurated.

K. A. Davis, of the Perron gold mine, has been elected president of the Western Quebec Mine Managers Association. Other officials elected are: vice-president, T. E. Little, of Waite Amulet Mines; secretary-treasurer, J. P. Millenbach, of Canadian Malartic Mines. Newly elected directors include Andrew Robertson, Golden Manitou Mines; W. J. Hosking, McWatters Gold Mines; George Robinson, Stadacona Rouyn Mines; and Ben Budgeon, Belleterre Gold Mines.

C. H. Burgess has resigned from the Aluminum Division of the War Production Board in Washington to take a position with the United Engineering Corporation, S.A., 620 Fifth Ave., New York City. He will leave shortly for several months' work in Colombia.

G. M. Wiles, general mine superintendent of Tri-State properties of St. Louis Smelting & Refining Co., has been transferred to the McIntyre mine of Titanium Pigment Corp., in New York, a subsidiary of National Lead Co. Wiles was manager for Park City Mines Co. in Utah before going to the Tri-State region in 1942.

R. S. Douglas has been named superintendent of the Copper Mountain mine of Granby Consolidated Mining, Smelting & Power Co., Ltd.

T. S. "Tommie" McKay, long associated with Premier Gold Mining Co., Ltd., and later with Kensington, has been promoted to the rank of Wing Commander in the R.C.A.F. and is senior intelligence officer for the Canadian bomber group overseas.

James Robinson, international representative of the International Union of Mine, Mill and Smelter Workers, has returned to British Columbia after an absence of more than forty years. His son, **Reid Robinson,** is president of the union. In 1898 Robinson, Sr., was secretary of the Ymir local of the Western Miners' Federation.

George W. Potter, of Joplin, Mo., vice president and general manager of the Eagle-Picher Mining & Smelting Co., retired from the company's service on Sept. 1 to devote himself to private

GEORGE W. POTTER

business. Mr. Potter has been with the Eagle-Picher organization since 1915 and has been general manager of the mining and smelting subsidiary since its establishment in 1930. Executive direction of the company has been taken over by **J. M. Bowlby,** president of Eagle-Picher Lead Co., as general manager, assisted by a three-man committee consisting of **D. C. MacKallor, H. A. Gray** and **Elmer Isern,** formerly assistant general manager, general traffic manager, and superintendent of concentrators, respectively. All three are now vice presidents of the company.

Douglas Malcolm represented the Consolidated M. & S. Co. during the current Whitesail Lake gold rush; Pioneer Gold was represented by **Franc Joubin** and **Charles R. Cox;** Privateer by **Walter Lammers** and **Frank Merryth;** and Quebec Gold by **Ed. Lovitt.**

Perry D. Helser, formerly chief of the magnesium branch of the War Production Board in Washington, has been selected as secretary-director of the newly organized Magnesium Associ-

PERRY D. HELSER

ation, with headquarters at 30 Rockefeller Plaza, New York City. Membership in the association comprises producers, consumers, and fabricators of magnesium, numbering 33 and representing a substantial portion of the industry.

W. S. Murphy, of New York, has resigned as chief of the Gold and Silver Section of the Miscellaneous Minerals Division of the War Production Board, to return to private business. **Harry E. Strauss,** of Milburn, N. J., now in charge of the Rare Metals Section of the Miscellaneous Minerals Division, will become chief of a merger of the Gold and Silver Section with the Rare Metals Section and the Mercury Section, recently announced by WPB.

George R. Fisher, superintendent of Zinc Corp., Ltd., Broken Hill, N.S.W., has been elected president of the Mine Managers Association at Broken Hill, succeeding **Andrew Fairweather.**

F. M. Mitchell, secretary of Broken Hill Proprietary Co., Ltd., and sub-

sidiaries for 21 years, has retired. He has served the company for 53 years. **R. G. Newton,** formerly works secretary at Newcastle, N.S.W., has succeeded Mr. Mitchell.

A. E. Paton, assistant manager of South Kalgurli Consolidated, Ltd., has been elected chairman of the Kalgoorlie branch of the Australasian Institute of Mining and Metallurgy for 1944–45.

Melburne McKim O'Brien, who resigned last month as consulting engineer for Consolidated Mining & Smelting Co. of Canada, Ltd., has assumed his new duties as vice president and man-

MELBURNE McKIM O'BRIEN

aging director of Bralorne Mines, Ltd. with offices in Vancouver. A graduate of Acadia University and Nova Scotia Technical School, Mr. O'Brien spent 31 years in the service of Consolidated, and is one of the best-known engineers in western Canada.

J. M. Johnson, chief engineer for the Oliver Iron Mining Co. at its operations in Marquette County, Mich., since 1938, was appointed assistant of the Spruce mine, at Eveleth, Minn., starting Aug. 1.

G. C. Niday, of Miami, Okla., has announced his resignation as Tri-State manager of mines for the Eagle-Picher Mining & Smelting Co., effective Sept. 1. He expects to devote his attention to private business. His successor has not yet been selected.

Alberto J. Terrones, mining geologist, who has been in the United States for the past two years acquiring experience in mining geology under the program of the Inter-American Training Administration, returned to Mexico City about the middle of August, having completed his period of training. He spent eleven months with the American Metal Co. in exploration work, six and one-half months with the geological department of Anaconda Copper Mining Co. in Butte, and three and one-half months with a field party of the U. S. Geological Survey at Eureka, Utah. Mr. Terrones is a graduate of the National School of Engineers, National University of Mexico.

H. A. Lever has been appointed chief engineer of the State Division of Lands and Minerals, Department of Conservation, State of Minnesota, with offices at Hibbing. Previous to his employment by the State he was an engineer for the Oliver Iron Mining Co. in the Chisholm district.

J. M. Johnson has been appointed assistant superintendent of the Spruce mine of the Oliver Iron Mining Co. in the Virginia-Eveleth district on the Mesabi Range.

Chester A. Fulton, president of the A.I.M.E., was the recipient of the University Medal for Excellence at the 190th commencement exercises of Columbia University, awarded for the "most effective administrator and research worker in his chosen field."

Otto G. Carstens, former general manager of the Clear Creek Gilpin custom mill and the Conqueror Operating Co., has joined the staff of the Highland Mary mines, near Silverton, Colo.

W. E. Scott, Jr., has again opened his consulting engineering office at Central City, Colo., and is resuming general practice.

Charles N. Williamson, of Winnemucca, Nev., has been appointed general superintendent of the property of the Colorado Mercury Co. near Gunnison.

I. V. Korts, a mining engineer for the Federal M. & S. Co. in the Tri-State district for 20 years, has resigned to accept a position with the Western-Knapp Engineering Co., Malvern, Ark.

John H. Melvin, geologist of the Pennsylvania Drilling Co., Pittsburgh, Pa., is spending several months in the vicinity of Carlsbad, N. M., where the company is engaged in extensive potash mineral exploration.

A. H. Heller, Los Angeles, Calif., returned recently from Nicaragua after completing a survey of the possibilities of gold production in that country. He has recently resumed active work as a consulting mining engineer.

R. J. Lund has resigned as director of the Miscellaneous Minerals Division of WPB to become assistant director of the research department of Reynolds Metal Co. at Glen Cove, N. Y. Lund has been with WPB since the formation of its predecessor, the National Defence Advisory Commission.

Hubert O. De Beck, who has been district manager and field engineer for Colonial Mica Corp. at Custer, S. D., is now technical assistant to the president in the company's New York office.

Robert J. McEwen has resigned as chief of the mercury section, War Production Board, to become vice president of the Metal Salts Corp., a subsidiary of New Idria Quicksilver Mining Co., Paterson, N. J.

Dr. Robert M. Thompson has been made resident geologist for the Lake of the Woods mineral area, in the Patrician district of Ontario.

Samuel Lipkowitz, formerly in the Labor Division of WPB, is now head of the Minerals Section of the Commodity Division of the State Department.

Arthur Phillips, professor of metallurgy at Yale University, has completed a three months course of lectures at the Escola Politecnica da Universidade de Sao Paulo, Brazil, where he instructed a class of 86, including several industrialists, on nonferrous metals and alloys.

W. J. Loring recently returned from a professional assignment in southern California and Nevada which covered five months. He may be addressed at the Olympic Hotel, San Francisco.

John Edgar has returned to the staff of the Sunshine Mining Co., Kellogg, Idaho, after having supervised the 6,500-ft. extension of the Treasury tunnel and other initial development work at the property of the Idarado Mining Co. near Ouray, Colo.

OBITUARIES

M. F. Fairlie, consulting mining-engineer of Toronto, Canada, died late in August. Early in his career he has been associated with the Mining Corp. of Canada, and later with Anglo-Huronian, Ltd. He was also a consultant for McKenzie, Red Lake, and Kerr-Addison companies.

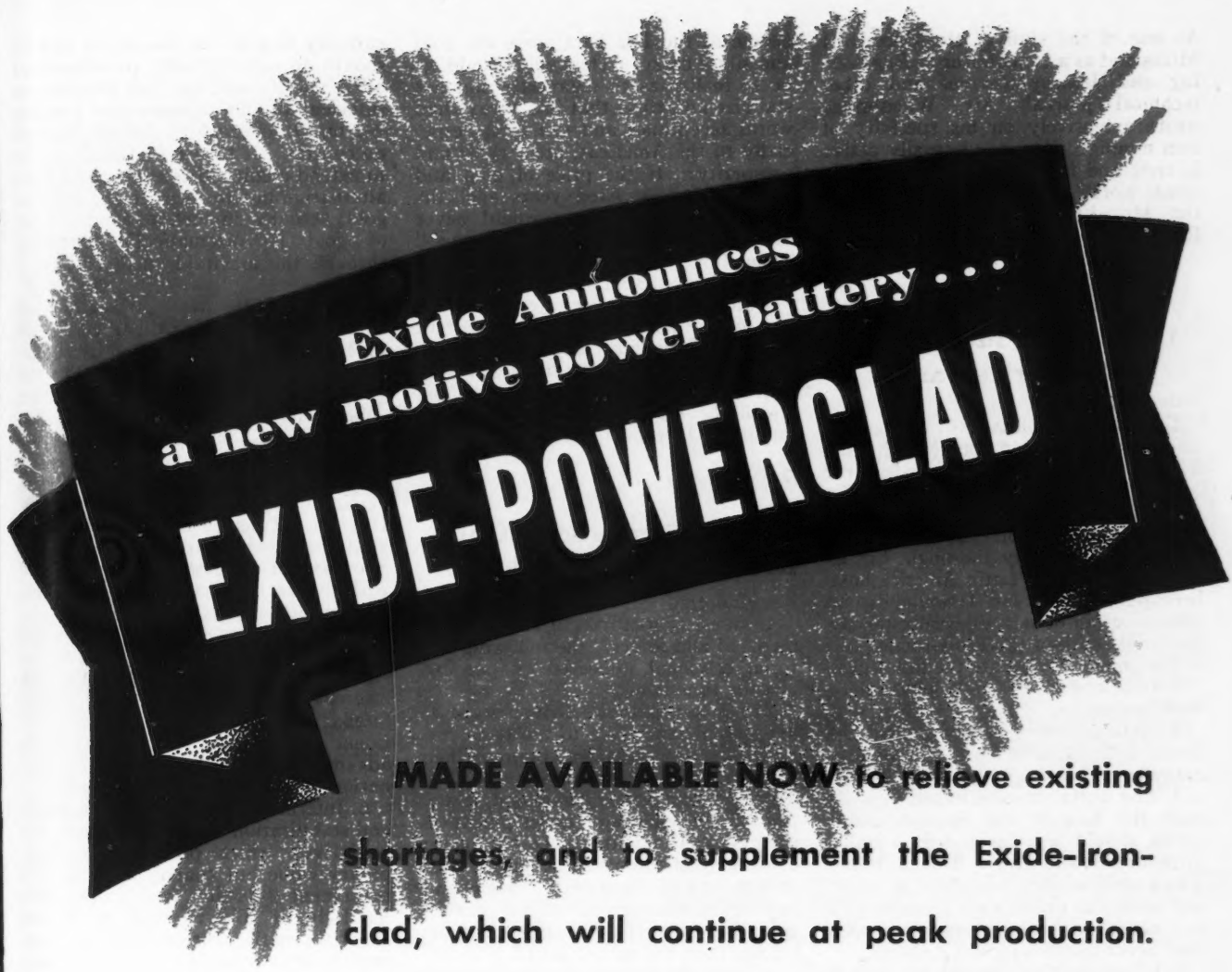
Martin Hokanson, research engineer of Duluth, Minn., died on July 29 last at the age of 64.

Robert C. Jacobson, Kingman, Ariz., died July 30 at the age of 64. He first came to the Kingman district in 1907, where he later established an assay office and was actively engaged in mine development.

Dick A. Mitchell, chief mining engineer of the Division of Lands and Minerals of the State of Minnesota, died July 25 in a Virginia, Minn. Mr. Mitchell, a resident of Mountain Iron, Minn., was in charge of the Hibbing office of the Department of Conservation. He was 68 years old.

Prof. Charles H. Baxter, 65, head of the Mining and Civil Engineering departments of the Michigan College of Mining and Technology, Houghton, Mich., died on July 29. He was an alumnus of the college and was active in its development since graduating in 1902.

Dwight E. Woodbridge, mining engineer, widely known for work in exploration and development of iron ore deposits, died in Duluth, Minn., July 15, 1944, at the age of 82. Mr. Woodbridge was born at Newton, Mass., but moved to Duluth at an early age. After a varied experience in the North Country he entered and graduated from Carleton College, Northfield, Minn. in 1887 and followed mining as a career. Both his experience and reputation were world wide in scope. He was greatly interested in the utilization of low-grade iron ores and was associated with the early work at Babbitt, Minn.



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As one of the staff of the Bureau of Mines and as a contributor to *Engineering and Mining Journal* and other technical journals Mr. Woodbridge wrote extensively on his specialty of iron mining. He was unusually active in civic and fraternal as well as professional work. Surviving are his daughter, Mrs. Lydia Jamar, and his son, Roger M. Woodbridge, both of Duluth.

LETTERS

Urges Hard Money and Silver Price Parity

The Editor:

I HAVE BEEN READING with great interest the article in your March issue "What's Ahead for Gold and Silver Money" and different comments by readers published in the June issue.

The discussions of this very important item are pretty thorough, but as no comments from Latin America have been published so far, I would like to add my grain of salt, especially for the countries south of the Rio Grande.

My points of view are the following:

1. Gold and silver should have a fixed world price.

2. Sixteen ounces of silver should be worth 1 oz. of gold (as per opinion of many).

3. The world's mining industry, or at least the English and Spanish enterprises, should organize and fix a stable price for gold and silver. It is the miner who knows what it costs him in sweat and money to produce an ounce of gold and silver, not the financier and men that never handled pick and shovel.

4. Of course there should not exist a price difference between the North and South American produced ounce of silver as at the present moment, whereby in the United States the miner gets 77.11 cents and the Latin American miner only 44.75 cents. There should be price parity; live and let live, the motto.

Mexico is the world's foremost producer of silver, and other Latin American countries also produce quite a lot, according to the statistical record of *Engineering and Mining Journal*, covering the years of 1882–1941. It is easy to understand that these countries would undergo a real boom if the price of silver would be fixed and if one ounce of gold would be equal to 16 oz. of silver. This boom would directly benefit United States exports in a big way and the Good Neighbor Policy could not find a better promoter.

Common sense dictates that the English and Spanish speaking countries should have a stable gold and silver price, because they are the foremost producers of both metals. Production of these commodities means work and prosperity to hundreds of thousands of families.

It is a well-known fact that every man, woman, and child in the whole world likes the feel and color of a gold and silver coin, as well as jewelry made from these metals. Over a billion people in the Far East alone are gold and silver crazy. Then why should we be so foolish as to depreciate and not stabilize an article that has always had world acceptance and can bring, especially to the Americas, great gains and prosperity? If the price of gold and silver had been fixed years ago, the United States Treasury would never have had the chance to "cold storage" some three-quarter billion ounces of gold and about six billion of silver.

Unity is power. I sincerely wish that the mining enterprises of the Western Hemisphere will accomplish it in the near future. Other countries will have to follow, and then by coordinated effort it will be easy to adjust one of the important factors of world economy.

JOSÉ ITEN.

Guatemala City, C. A.

Trade Overshadows Gold in Restoring Normalcy

The Editor:

UNDER THE HEADING "Crucial Period for Gold and Silver," the following editorial comment appeared on page 68 of your June issue:

"In a nutshell, the British want to keep their hands free to resort to currency juggling if that will improve their trade position or the stability of their domestic economy. They find it impossible to view any development as progress that might reduce the power or prestige of the mother country, even though their three most important colonies produce most of the world's gold and are heavily dependent on income from the sale of gold."

It is not my purpose to comment upon your slighting reference to Great Britain's motives in opposing a return to a fixed gold standard, nor to your implication that Canada is still only a colony, instead of a full partner in the British Commonwealth of Nations. Since, however, your statement disregards certain fundamental factors affecting the maintenance of the gold standard, I would like to submit a few observations on the economics involved.

1. In the long run, the exports and imports (visible and invisible) of every country are bound to balance, regardless of the gold standard or any other artificial standard. It would be amusing if the results were not so disastrous, to note the almost universal desire to exchange a maximum volume of exports for a minimum volume of imports.

2. Temporarily, the failure of ordinary exports and imports to balance can be taken care of by the transfer of gold or extension of credit, but the flow of gold cannot continue indefinitely (except for current production), and debts created by borrowing can never be paid except by the transfer of commodities (including gold), or invisible exports, such as result from dividends, royalties, and the expenditures of tourists. Surely the United States does not ask for any further demonstration of this fact!

3. If a debtor nation undertakes to maintain permanently a fixed ratio of currency to gold—as you imply Britain should do—she virtually promises that other nations will buy her products in sufficient volume to make that possible—a matter over which she has little or no control. If they refuse to do so, or to extend credit indefinitely, she has no alternative but to increase the price of gold; actually, in such a case the price of gold is automatically increased through the inevitable depreciation of currency.

4. If a creditor nation "juggles" her currency by increasing the price of gold to facilitate exports and restrict imports (as the United States did some years ago), the first result is to attract gold; ultimately, such a country must either increase her imports, decrease the price of gold, or face the necessity of cancelling foreign debts, thereby converting her exports into outright gifts. It is not yet clear which alternative the United States will adopt in the future. She has not appeared wholly satisfied with the last alternative, so extensively tried in the past.

5. The United States has provided the world's outstanding example of the advantages to be derived by the free interchange of goods between states. Similar economic laws govern international trade, and similar world-wide advantages may be derived if the nations see fit to adopt wise policies.

6. International currency agreements and stabilization funds are at best only palliatives, which possess some temporary value but contribute little to a permanent solution or the problem. Similarly, if gold be well distributed along the nations, it can play a useful part in the adjustment of temporary inequalities in trade, but the only real solution lies in mutual willingness to exchange commodities and services.

F. E. LATHE.

Ottawa, Canada.

Editors' Note:

We acknowledge our error, according to British Empire terminology, in speaking of South Africa, Canada, and Australia as "colonies," having intended the term in a general sense. Whether the United Kingdon's gold policy takes account of the interests of these three dominions is a matter on which we are quite willing to let the facts speak for themselves.

We find ourselves in general agreement with Mr. Lathe's views, simply offering the following qualifications: Anent point No. 3, there is another alternative, albeit a distasteful one to modern economists and sociologists—namely, the lowering of a nation's living standards as a means of making its goods cost less in foreign markets. On No. 4, we remark that the U.S.A. was the last great trading nation to fall into step on devaluation in the thirties. On No. 5, we believe that, whatever tariff policies the future may hold, low-tariff advocates will defeat their own ends if they seek to make changes so drastically that domestic economies will be dislocated.

THE EDITORS.

. . . AND MOLYBDENUM CAME TO A HIGH PLACE

Brigham Young could not have known. In 1847, when the leader of the Latter-day Saints guided his band of exiled kinsmen into the radiant and fruitful expanse of Salt Lake Valley, the distant Bingham Canyon in the Oquirrh Mountains was simply a magnificent backdrop for the spot now to become home to the Mormons.

"This is the place," said Young; and here was built "the center stake of Zion." Years of brilliant skies rolled past this peaceful setting before Bingham Canyon was revealed as guardian of the greatest copper deposit in the North American continent. Only in the 90's did large-scale mining begin . . . and it was 1936 before the valuable by-product, Molybdenum, was recovered commercially.

Before 1936, Molybdenum was but a lowly thing—a contaminent of the copper concentrate. Today, its place is a high one in American industry. Thanks to Dow Xanthate, the mixed concentrate of copper and Molybdenum are separated. The separate results are a higher grade copper concentrate AND Molybdenum . . . Molybdenum for the production of better steel alloys.

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DOW

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NEW BOOKS

DANA'S SYSTEM OF MINERALOGY, Vol. I. By Charles Palache, Harry Berman, and Clifford Frondel. John Wiley & Sons, Inc., New York 16, N. Y. Chapman & Hall Ltd., London. Pp. 834. Price $10.

More than a century has elapsed since James Dwight Dana published the first edition of his classic "System of Mineralogy" in 1837. That it has survived and held its leading position through six editions, and is now in its seventh, is at once a record seldom if ever achieved by a scientific book, and a tribute to the fundamental character of the work done by the original author and his son, Edward Salisbury Dana, who issued the sixth edition in 1892. The seventh edition, to be published in three volumes, has been entirely rewritten and enlarged by the present authors. With justifiable pride the publishers call this the "centennial anniversary issue," because they were first connected with the Dana book in 1844.

Probably few have any adequate conception of the magnitude of such an undertaking as the complete revision of this work. First proposed in 1915 and seriously undertaken in 1927, it was not until 1936 that the authors realized that progress would be slow unless competent men could devote their full time to the work. Accordingly application was made to the Geological Society of America for a grant from the Penrose fund. This was made available in 1937 and the first volume was completed in 1941. The dedication of the book to the memory of R. A. F. Penrose and A. F. Holden is a reminder of the indebtedness of all to the bequests of these gentlemen to the Geological Society of America and to Harvard University.

The current volume deals with the elements, sulphides, sulphosalts, and oxides. Vol. II will contain the halides, carbonates, sulphates, borates, phosphates, arsenates, etc. Vol. III will be devoted to silica and silicates. The latter two volumes will be issued as soon as possible after the war.

Indicative of the extensive changes made in the seventh edition is the following brief tabulation:

A new mineral classification, based on crystal chemistry.

A new elastic series of classification numbers for species.

Revised morphological elements based on the structural unit cell.

A new form of presentation of the crystallographic data.

Introduction of data derived from X-ray crystallography.

Revision of specific gravities, based on new observations.

Introduction of optical characters of the opaque minerals.

A new chemical treatment of species, with generalized formulas for types, discussion of group relations, and a sharper definition of varieties.

A new method of treating minerals that form a so-called series; describing a series as if it were a single-species description.

Expansion and annotation of the reference section to include sources of data, transformation formulas, lists of rare forms, general literature, and a statement of controversial questions requiring elucidation.

"HARD MONEY" EXAMINED, by Herbert M. Bratter. Senate Document No. 197, 2d Session, 78th Congress; Committee on Foreign Affairs. Pp. 13. Available from U. S. Senate or Superintendent of Documents, Washington, D.C. Free.

A critique of the paper "Hard Money" by Francis H. Brownell. The author makes a hard-hitting case against the establishment of international bimetallism at a high silver price or without concurrence of Oriental countries. Readers interested in monetary policy will find it thought provoking.

METALLIC MONEY OR MANAGED CURRENCY? By René Léon. Published by the author, Drakes Corner Road, Princeton, N. J. Pp. 14.

The author urges bimetallism as a sound money program for the future. He proposes to assure a supply of monetary metal in government stocks by throwing hindrances in the way of hoarding and of exchange speculations. He contends that credits should be lend-leased after the war, and that the United States should use its credit powers to enforce fixed international monetary metal prices after logical prices have been established by international agreement. The pamphlet expounds the inevitable clash between domestic and international stabilization programs.

POSTWAR MONETARY STANDARDS—A SYMPOSIUM. The Monetary Standards Inquiry, 420 Lexington Ave., New York 17, N.Y. Pp. 236. Price 50c.; 75c. abroad.

This booklet binds into a single issue the eleven pamphlets published by the Monetary Standards Inquiry, ten of which have been reviewed separately in our April and May issues. Recommended as a well-rounded study illustrating the range of modern competent thinking on monetary policy, including gold standardism, international bimetallism, managed currencies, and commodity-backed money.

The eleventh pamphlet, 16 pp., "The Place of Silver in Monetary Reconstruction," by Humphrey Mitchell, advocates international bimetallism, principally because of the scarcity of gold, with ratios of gold and silver values close to prevailing prices in bullion markets. Available as pamphlet in single copies free.

PUBLICATIONS RECEIVED

The U. S. Geological Survey has published the following bulletins which may be obtained on application to the Director, Washington 25, D. C., unless otherwise indicated:

"Copper-Bearing Deposits of the Mount Andrew-Mamie Area, Kasaan Peninsula, Prince of Wales Island, Southeastern Alaska."

"Zinc Deposits of the Lucky Boy Claims, Dora Lake, Prince of Wales Island, Southeastern Alaska." Maps.

"Lode Scheelite Deposits of the Nome Area, Seward Peninsula, Alaska."

"Geology of the Mineral Ridge Fluorspar Property, Livingston County, Kentucky." With maps. Available for inspection in the files of the Geological Survey at Washington, D. C., and Rolla, Mo., and in the Post Office at Marion, Kentucky.

"Preliminary Report on Geology and Ore Deposits of the Minturn Quadrangle, Colorado." With map. Available for inspection in the files of the Geological Survey, Washington, D. C., and at the office of the Bureau of Mines, Denver, Colo.

Plan for Employment of Disabled Veterans and Handicapped Persons. National Association of Mutual Casualty Companies. Distributed by American Mutual Alliance, 919 N. Mich. Ave., Chicago 11, Ill.

"Geology of Nevada Ore Deposits," by Bernard York; and "The Mining Districts of Nevada," by Henry G. Ferguson. University of Nevada Bulletin, July, 1944. Published by the Nevada State Bureau of Mines and the Mackay School of Mines, Reno, Nev. Pp. 110. Price 50¢.

"Mining Directory of Minnesota, 1944." By Henry H. Wade. Bulletin of the Mines Experiment Station, University of Minnesota, Minneapolis.

Truck Tire Outlook. A pocket pamphlet by J. E. Powers, The B. F. Goodrich Company, Akron, O.

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CLEVELAND...E. 53rd and Lakeside Ave. Henderson 1000
PITTSBURGH.....330 Grant St. Walnut 7540; Carnegie 795
PHILADELPHIA.....5200 Grays Ave. Bell-Belgrade 1412; Keystone-West 1644
BUFFALO.....40 Stanley St. Humboldt 3311
NEW YORK.....203 Westside Ave. Jersey City, N. J.
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REGIONAL NEWS

More than 60 women are engaged in various jobs at the Garfield Smelter of the American Smelting & Refining Co., Utah. They not only tend sampling machines and work about the yard, but also unload concentrates from box cars, as shown herewith

ARIZONA

Shortage of auxiliary labor results in lower output at several mines

★A shortage of train crews and track repairmen in the pit of New Cornelia Copper Co., Ajo, has forced a reduction in tonnage mined to 18,000 tons daily from the maximum capacity of the mill, which is 25,000 tons. An adequate mill crew is available to permit capacity operation if the mine could maintain that output.

★A similar situation prevails at the mine of Bagdad Copper Co., Hillside, where the mine output is less than the mill's capacity because of a shortage of relatively unskilled labor, such as chute pullers. Skilled miners are at work in the mine in sufficient numbers to hold a high output, but they are held back by lack of these auxiliary services. Arthur Kendall is manager at Bagdad, and Mr. McIntosh, for many years at Nacozari, Sonora, is mill superintendent. The company's molybdenum recovery unit is in successful operation under their direction.

★Temporary shutdown of one reverberatory furnace at the Clarkdale smelter has made necessary a reduction in shipments to the smelter of ore from some of the small mines in the Prescott area. The Binghampton mine, operated by Glenn Francis, Prescott, is now producing about 600 tons monthly of copper ore, although capable of turning out about 1,000 tons a month. The copper mine near Jerome that Mark Gemmill is now operating is on a similarly reduced schedule. Mr. Gemmill formerly directed operations at the Yarnell mine near Congress Jct., which is a gold producer now inactive under WPB order L-208.

★Operations at the Iron King mine of the Shattuck-Denn Mining Co., near Humboldt, are up to capacity of about 375 tons daily of the hard, complex, lead-zinc ore. The mine's auxiliary cyanide plant has not been operated for some time. H. F. Mills, Prescott, is manager of the Iron King; Elmer Tompkins is mine superintendent and A. L. Pessin is mill superintendent. The nature of the ore at the Iron King requires selective mining and milling, the flotation separation of lead and zinc being particularly difficult. Results, however, are satisfactory despite these handicaps.

★Arizona Antler Mining Co., headed by F. F. Hintze, geologist and engineer, has been formed to resume operations on the Antler copper-zinc property 12 miles from Yucca. Kenneth Watkins, engineer, who was manager of the mine for the Silver Shield Mining Co., former operators, will contract the mining of the ore. All equipment has been overhauled and a larger skip has been installed. Ore will be hauled to Yucca and consigned to United States Smelting, Refining and Mining Co., Midvale, Utah.

IDAHO

Hecla mine, nucleus of extensive organization, hoists last ton of ore

★In a preliminary report covering operations at the Sunshine mine for the first half year period in 1944 R. D. Leisk, general manager, announces that production from the rich veins owned by Sunshine has practically ceased during the development of the newly discovered Chester vein system 500 ft. north of the Sunshine workings. During this period, the report says, only 3,892 tons of ore was mined from the Sunshine veins, while 53,156 tons was mined from the several openings in the Chester vein system. During the six months period the mill feed treated averaged 7.56 percent lead and 40.74 oz. silver per ton. Silver recovered from the concentrated product amounted to 2,267,507 oz.; lead recovered totaled 8,408,077 lb. and copper, 487,748 lb. Total net smelter returns for the six months period amounted to $2,082,255.32. Mine profits for the quarter ending June 30 are estimated at $468,472.59.

New development work consisted in drifting east on the ore body on the 2300, 2500, 2700, 2900 and 3100 levels. This work totaled 1112.8 ft., all of which was in ore. Raises in ore totaled 327.1 feet. Crosscutting to the vein on the 1900 level proved the ore values do not extend up that high. The different areas prospected consisted of 773.2 ft. in the Omega area, 62.5 ft. in the Rambo area, 847.2 ft. in the Rotbart area and 140.2 ft. on the 3700-ft. level in a new crosscut recently started from that level to open the new vein 600 ft. deeper than the present lowest opening. This new crosscut is 1,000 ft. below sea level and is the deepest mining operation in the

Idaho (*continued*)

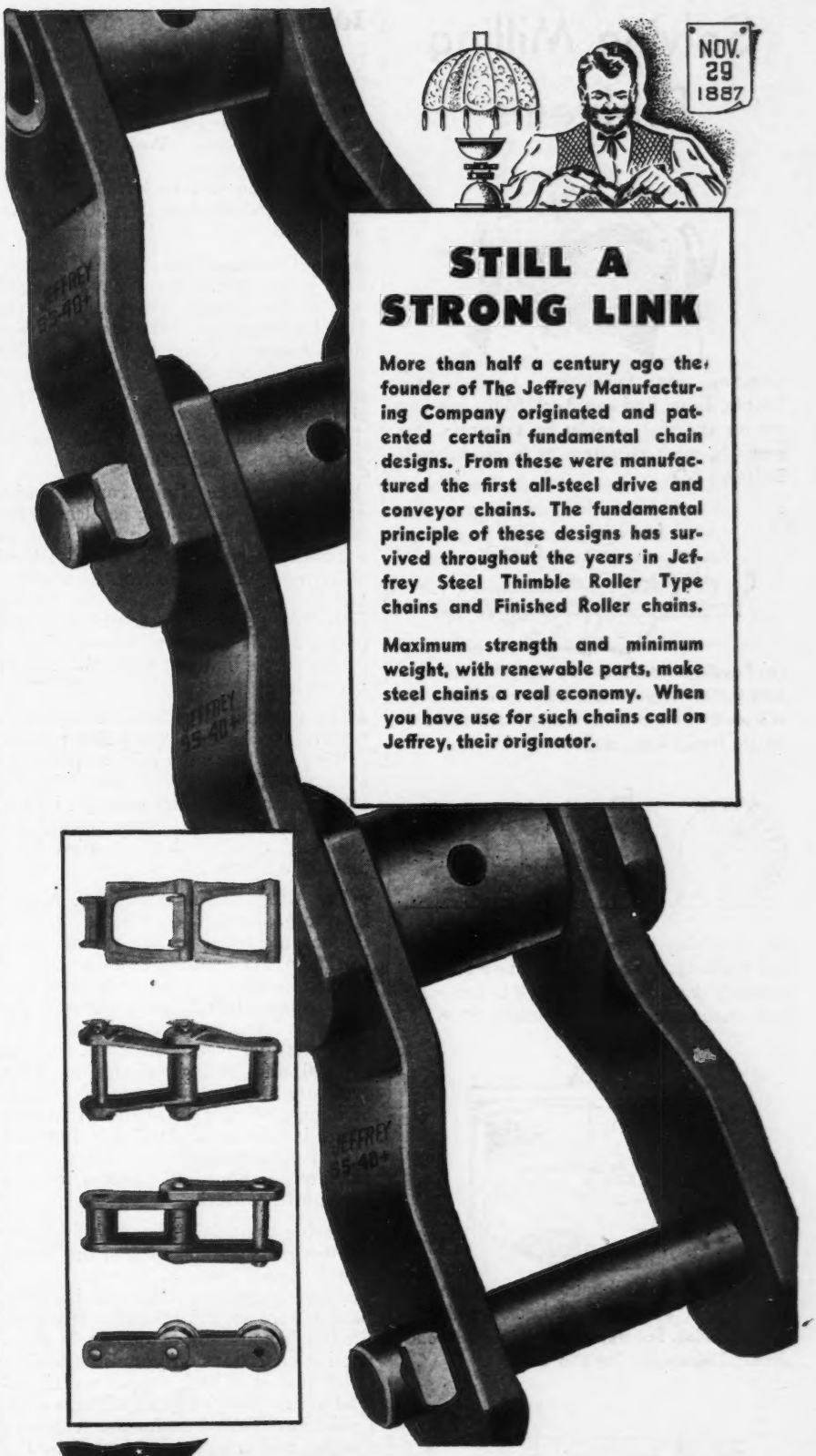
Coeur d'Alene district. The reason for shifting production to the Chester vein is because of the greater lead content in the Chester vein ore body.

★Silver Cable Mining company, on top of the Bitter Root divide about 6 miles east of Mullan, has declared its first dividend, amounting to $12,500, or at the rate of 1 cent per share. The dividend is payable to stockholders as fast as they can be located and their ownership of stock certificates established. The Silver Cable property is under lease to the Hecla Mining Co. on a royalty basis. The mine is operated only during about 9 months of the year because of its location in a heavy snow belt. During the past two seasons Hecla has maintained ore shipments at the rate of about 80 tons per day. The crude ore is hauled 17 miles by truck to the Hecla mill at Gem. The ore is a zinc-lead product with small values in silver.

★The Callahan Consolidated Mining company has issued a statement to its shareholders covering mining and milling operations for the first six months of 1944. During that period, the report says, the company mined and milled 10,484 tons of zinc-lead ore and received from shipment of concentrates net smelter returns totaling $126,052.40. Operating expenses totaled $80,070.92, leaving net income from operations before depletion, depreciation and taxes of $45,921.48. Ore in transit to the smelter is estimated at $13,096.64. The company recently purchased the Delaware group of claims adjoining the present operating group. The purchase price is not mentioned in the report but it is stated that $18,313.42 is due on the purchase price Dec. 31, 1945; $25,000 on Dec. 31, 1946, and $2459 on Dec. 31, 1947.

★Bunker Hill & Sullivan Mining & Concentrating company has declared its third quarterly dividend of 12½ cents per share for the year 1944, totaling $163,500 for the current quarter and $490,000 for the three quarters. This brings the total dividend payments to date to $59,077,741. The mine has been paying a 25-cent dividend until shortage of manpower coupled with increased taxation forced curtailment. The mine's ore resources are greater than ever before in the 60-year history of the property and the company is now making expensive underground installations of machinery in preparation for the opening of deeper levels.

★At a regular stockholders meeting of the Silver Syndicate Mining company held in Wallace July 26 the company ratified a new contract with the Sunshine Mining company whereby the two companies will in future share 50-50 in the net profits from ores mined in the Rambo area on the Chester vein system lying within Silver Syndicate territory, estimated to be about 3,800 ft. in length. Heretofore the division has been 60 percent to Sunshine and 40 percent to Silver Syndicate. Under the



STILL A STRONG LINK

More than half a century ago the founder of The Jeffrey Manufacturing Company originated and patented certain fundamental chain designs. From these were manufactured the first all-steel drive and conveyor chains. The fundamental principle of these designs has survived throughout the years in Jeffrey Steel Thimble Roller Type chains and Finished Roller chains.

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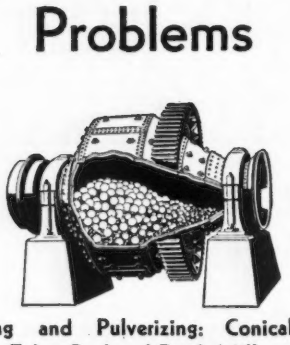
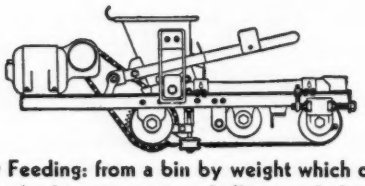
Chicago 1	Harlan	Pittsburgh 22	
	Houston 5	St. Louis 3	

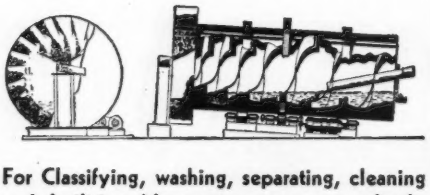
Solving Milling Problems



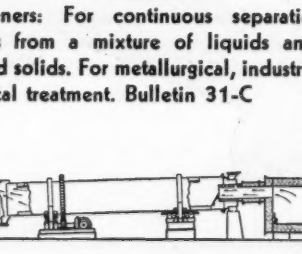
Grinding and Pulverizing: Conical Ball, Pebble, Tube, Rod and Batch Mills, grinding wet or dry. For granular or extremely fine products, using classifiers, or in open circuit. Bulletin 13-D



For Feeding: from a bin by weight which corrects for bin segregation, bulking and change in weight of the material being fed. Record of weight is also kept. Bulletin 33-C



For Classifying, washing, separating, cleaning and desiliting. No moving parts save a slowly revolving drum. Separates from 8 to 325 mesh with unusually clean sands. Bulletin 39-A



Thickeners: For continuous separation of liquids from a mixture of liquids and suspended solids. For metallurgical, industrial and chemical treatment. Bulletin 31-C

Ruggles-Coles Rotary Dryers: single shell, double shell, indirect heat, direct heat, steam tube types. Drying stone, clay, coal, chemicals, concentrates and the like. Bulletin 16-C

HARDINGE
COMPANY, INCORPORATED - YORK, PENNSYLVANIA
NEW YORK, CHICAGO, SAN FRANCISCO, TORONTO

Idaho (*continued*)

new contract Sunshine will receive $1 per ton for milling the ore. Officers and directors who served during the past year were re-elected. They are W. M. Yeaman, Yakima, Wash., president; A. H. Featherstone, vice-president; Ray Morrison, secretary-treasurer; Mrs. Alma Kingsbury and Mrs. Olga Marquardt, directors, all of Wallace.

★Pine Creek ranchers, Ralph Gehreand and James Richardson, have brought suit in the district court against the Highland-Surprise, Denver Development and Pine Creek Lead-Zinc mining companies, alleging damage to ranch property in the Pine Creek district through pollution of irrigation water. The case will be tried before District Judge Miles F. Johnson of Lewiston.

★The Nancy Lee Mining company with headquarters in Kellogg has leased the King & Queen mining property at Superior, Mont., to E. G. Smith of Osburn. Smith plans to truck out a test run of King & Queen ore to the Golconda mill, the nearest treatment plant, and if the test is successful he contemplates building a portable mill at the mine.

★The Colonial Mica Mines company is reported to be employing 200 persons cutting and trimming mica at plants at Moscow, Deary, Troy and Boville. David Kempel, district manager for the company, says the company will indefinitely continue buying mica from custom producers.

★The King Mining company, a new Day organization controlling a continuous string of mining claims from Burke to the Snowstorm mine east of Mullan in what was formerly known as the "copper belt," has purchased the Marsh mining property at Burke for $2\frac{3}{8}$ cents per share in cash, paying $95,000 and 266,667 shares of King company stock at the rate of 1 share of King stock for 15 shares of Marsh. There is said to be 4,000,000 shares of Marsh outstanding. The Marsh company owns about 140 acres of mineral land north of Burke.

★During the mining boom incident to the discovery and opening of the Snowstorm copper mine at Larson, east of Mullan, many independent mining companies were organized and spent hundreds of thousands of dollars in prospecting operations on promising surface outcroppings of both copper and silver-lead ores. Practically all of these companies have folded up for one reason or another and have been absorbed by the King company. Some of the properties were patented and have been purchased for tax title. Others have been absorbed by purchase of the stock. Most of the companies did a large amount of work, but the largest expenditure was at the National Copper property, now one of the King group, where the National company drove a mile-long working tunnel, erected a 250-ton mill and build a two-mile narrow gage electric railroad connecting mine and mill. The National ore body was a similar occurrence to Snowstorm but proved to be too low grade to be of commercial value. The adjoining Copper King property also drove a mile-long tunnel to open a silver-lead vein at a depth of 1,700 ft. from the surface. This vein proved extensive and well mineralized but at this depth showed insufficient tonnage of commercial grade ore. Future work by the King company is expected to be on the Copper King vein through the National tunnel.

★According to an official announcement by company officials, the Hecla mine unit of the Hecla Mining company at Burke has been worked out after producing 9,050,977 tons of ore from which the company has received net smelter returns of $81,333,000 and has paid its stockholders dividends from this source totaling $27,405,000. This means that $53,928,000 has been paid out in operating expenses, including mine labor, transportation and mining supplies.

The last ton of ore was hoisted out of the mine on July 31 and the lower workings abandoned up to the 2,000 level, from which point a two-mile crosscut extends to the company's Star mine, which is on a capacity production basis up to the manpower available. The company has concreted the Hecla shaft for 200 ft. below the 2,000 level to provide a dry sump for the main operating shaft, forcing the lower ground water to discharge at a point several hundred feet further east. Before abandoning the lower workings of the mine the company engaged in extensive diamond drill work from the 3,600-ft. level but failed to locate any ore of importance at deeper levels. Drifting and crosscutting on this level also failed to open additional ore tonnage.

The Hecla mine was one of the important producing mine units of the Hecla company and the nucleus around which the Hecla organization was built. Foreseeing the end of the ore supply from this source, the late James F. McCarthy, general manager of Hecla up to 1940, recommended and started expansion of the company's mining activities, commencing with the formation of the Sullivan mining company in equal partnership with Bunker Hill & Sullivan for the purchase of the Star mine, westerly extension of the Federal Mining & Smelting Company's big Morning mine at Mullan. The Sullivan company drove a two-mile crosscut tunnel from the 2,000 level in the Hecla shaft and opened the Star vein at a depth of about 3,800 feet. Subsequent development has proven that the Star ore body is one of the largest deposits of zinc-lead ore in the Western States.

One peculiarity about the Star mine is that the entire mining and milling operation is what one might call "upside down." Most mines are opened from the top, but the Star was opened from the bottom and, instead of being hoisted, the mined ore is lowered from the different levels through the Star shaft to the main haulage level on the 3,800, whisked through the two-mile haulage crosscut by electric train to the Hecla shaft and hoisted 2,000 ft. to the Star mill, which has a capacity of

800 tons daily. This mill, because of limited building space, is also on the "upside down" pattern, being built two-stories high with the main crushing unit on the ground floor. From here the crushed ore is hoisted to the top of the mill by traveling belts to begin its journey downward again through ball mills, flotation machines and dryers to wind up as a finished product where it started, on the ground floor. The concentrated products, lead and zinc, are shipped over the O. W. R. & N. Ry. 14 miles to the Bunker Hill smelter and Sullivan zinc plant.

The next Hecla venture was the Sullivan company building of the big Sullivan zinc plant at Kellogg at an original cost of $3,050,000. This plant, under the management of Wallace G. Woolf, has become one of the largest producers of high-grade slab zinc on the western coast. It was the first zinc plant in the United States to produce 99.99+ percent pure zinc on a commercial scale, the forerunner of all other high-grade brands of zinc on the market today. The Sullivan plant employs approximately 350 men, uses 3,500 hp. of electricity and produces 350 tons of slab zinc and 36,000 lb. of cadmium per month.

The expansion program of the Hecla company has been continued under the present management of L. E. Hanley, who succeeded McCarthy as president and general manager, and who has recently acquired for the company the Silver Cable zinc-lead mine east of Mullan, which the company is operating under a straight lease, producing about 80 tons of ore per day, which is treated at the Hecla mill at Gem. The company's most important venture is a sink-and-float tailings plant at Osburn, about 4 miles west of Wallace, for the treatment of about 2,000,000 tons of impounded tailings. The plant is now treating about 2,000 tons of this material per day and shipping the product to the company's Gem mill for final concentration.

Other Hecla mining interests include the Resurrection mine near Leadville, Colo., in which the company is interested with the Newmont Mining Company and United States Smelting Company; the Blue Moon zinc property near Hornitos, Cal., on which the company has completed a milling plant which is expected to be in operation this year, and the Boundary Basin zinc property in British Columbia, adjoining the Reeves-McDonald zinc property 16 miles north of the Metaline Falls, Wash., zinc mines.

★The Atlas Mining company reports that the Zanetti Bros. lease, lasting from Dec. 1943 to May 1944, shipped 4,656 dry tons of ore to the Galena mill in Wallace and produced 267 tons of concentrates which averaged 66 percent lead and 16 oz. silver per ton. Net smelter returns on the concentrates totaled $31,786.52, including premium payments.

★The Ione Mining company on Bear creek in the Summit mining district near Murray has secured easement

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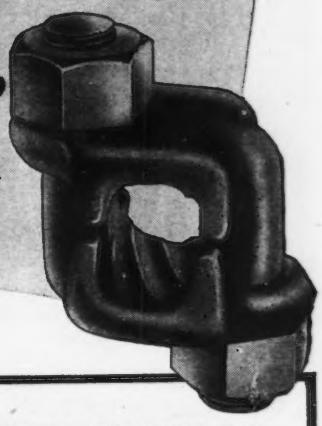

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Laughlin "Fist-Grip" Safety Clips fit right in with your plans. Even green men work safely with them.

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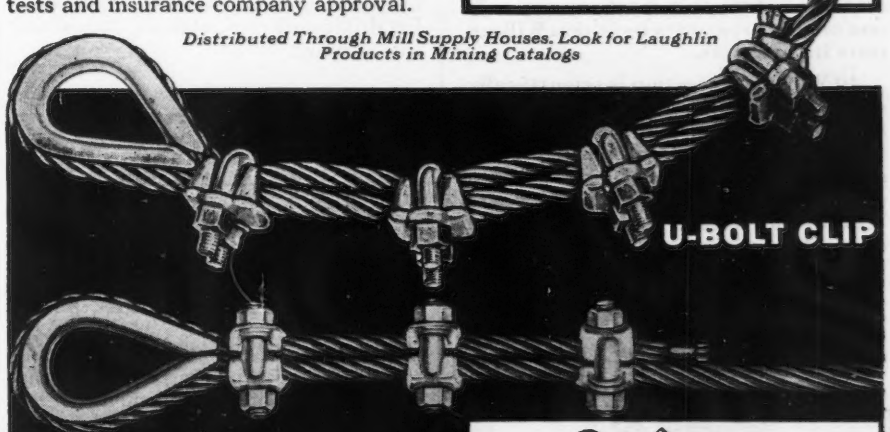

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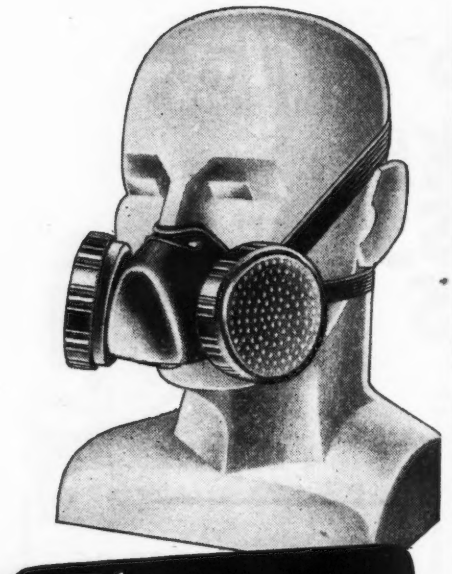

The man with the one-way nose

■ **Here's Oscar, a valued member of the Willson research staff who has a prized peculiarity: he can inhale without exhaling, or vice versa.**

Always breathing in one direction, he comes in mighty handy when respirators are to be tested. Put one on him and he'll inhale tainted air as long as his colleagues wish, while they measure and record the respirator's performance. And this is, of course, only one of countless ways by which Willson tests its products.

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Idaho (*continued*)

rights through the lower tunnel workings of the Bear Top mine and is driving a 450-ft. crosscut tunnel from the Bear Top workings to the Ione vein, which will give about 1,100 ft. of depth on a promising lead-silver surface showing. The company has installed an electric-driven air compressor for the job. Otto Nordquist of Wallace is president of Ione and Herman Swanson of Mullan mine superintendent.

★Stanley W. McDougall, mine superintendent at the Bunker Hill at Kellogg, has recently patented a portable "drill jumbo" machine which is reported to be giving excellent satisfaction in the Bunker Hill mine workings. It is claimed that drilling operations can be started in from 5 to 10 minutes after arrival of the drill carriage at the drift face, saving up to 1½ hours per shift. Outstanding features incorporated in the design of the jumbo are simplicity, compactness, sturdiness, flexibility and use of pivoted, pneumatically-operated tool columns. It will carry two drifters, is not overly heavy and requires little more room on a switch than an ordinary mine car. The drill carriage consists essentially of a 4-wheel truck made from channel irons and a steel saddle containing the air and water connections, holders for the tool columns and two air-operated, pivoted tool columns at one end. Operation is relatively simple. Upon arrival at the face the two tool columns lying on the drill carriage are raised to a vertical position, the extensions securing them quickly and accurately after opening the air valves. The device can be used for driving drifts up to 10 ft. wide and 10 ft. high, for drilling ditches, starting raises and side-swiping.

UTAH

Political action by CIO resented by Utah locals—Garfield expands plant for sulphuric acid

★More than 60 women now are doing "man's work," strenuous and grimy but well paid, at the Garfield smelter of the American Smelting & Refining Co. This plant, which turns out more than 30 percent of the nation's copper supply, was undergoing a stringent shortage of help, so the women were enlisted. They tend sampling machines, clean yards, unload cars, and do most other work.

★Resumption of development work in Big Cottonwood Canyon ore zones east of Salt Lake City is assured by installation of electric power and modern equipment, including an air compressor, a bit grinder, and rock drills, at the South Price tunnel, by American Metal Mining Co., controlled by the Mountain Mines Co. This group obtained an RFC loan in 1943 to open the old workings of the Gus Branburg tunnel, driven about 40 years ago, and which crosscut the Gustavus Adolphus, Garfield, and Silver King veins. Silver-zinc ore is in the area. Charles S. Woodward is president and general manager of American Metal Mining Co.; Glen A. Finlayson, vice president; and Frank Yanchar, superintendent.

★Construction now is under way on a $1,000,000 sulphuric acid plant of 150 tons' capacity at Garfield by the Garfield Chemical & Mfg. Corp., subsidiary of the Utah Copper Co., and American Smelting & Refining Co. The plant, to be completed within 10 months, will supply acid for the Geneva Steel Co. plant, the Utah Oil Refining Co. high-octane gasoline plant at North Salt Lake, the superphosphate plant now under construction at Pocatello, Idaho, the Simplot Corp., and numerous other consumers. The daily capacity of 150 tons is in addition to a 100 tons per day capacity of the company's existing plant. The acid is produced from copper-bearing iron pyrites. William J. O'Connor, Utah manager for A.S. & R., announced the expansion.

★Political action committees of local Union 65 at Bauer, and local Union 872, Tooele, tossed a bombshell into local political affairs on Aug. 12, when they made public letters attacking the program of the CIO political action committee as amounting to coercion and threatening their right to vote as they see fit under the constitution of the United States.

"We feel," said Vaughn Haslam, president, and T. Paul Thomas, of local 65's committee, "that regardless of belonging to any committee, church, union, or other organization, no one has the right to demand that we vote straight Democratic ticket or resign. It is for the freedom of speech and the right to vote as we see fit that our boys are fighting today. Union members are also fighting at home to increase production so that we will not have these rights taken from us. . . . "

Glen Spendlove, president; Andrew Cartwright; and Joe Beck, members, of local 872's PAC committee, said in their communication: "We are thoroughly convinced, from all apparent signs, that the CIO political action committee is trying to get control of the Democratic party. In every meeting that has been attended by state or divisional leaders of the CIO political action committee the minutes show every candidate endorsed has been of the Democratic party. In view of the above mentioned facts . . . we hereby tender our resignation, as we wish to be, and remain, free Americans with the right to cast our votes as our forefathers intended—free from pressure of any one man or group of men."

★The Utah war manpower commission has adjusted labor ceilings of the Utah Copper Co. and United States Smelting, Refining & Mining Co., permitting the firms to hire additional workers. Utah Copper was given an adjusted labor ceiling of 4,520 workers and may hire

400 additional workers before Sept. 10. U.S.S.R. & M's Lark mine was given an adjusted ceiling of 453 and permission to hire 91 workers before Sept. 8. Bingham mine was given a ceiling of 454, with permission to hire 120 more workers, and Midvale smelter was allowed a ceiling of 592 workers and may hire 15 additional workers—all if they are obtainable.

★During a visit in Utah and Nevada early in August, during which he inspected operations of Combined Metals Reduction Co., Former President, Herbert Hoover warned that stockpiling and possible gradual disposal of surplus metals at prices which would repay the government for wartime costs will be necessary to prevent paralysis of the metal mining industry in this country, with resultant unemployment.

★Washout of part of the Utah Copper Co.'s dike surrounding the company's tailings area near Magna stopped operations for several days early in August at the Magna and Arthur mills and at the Bingham open-pit mine.

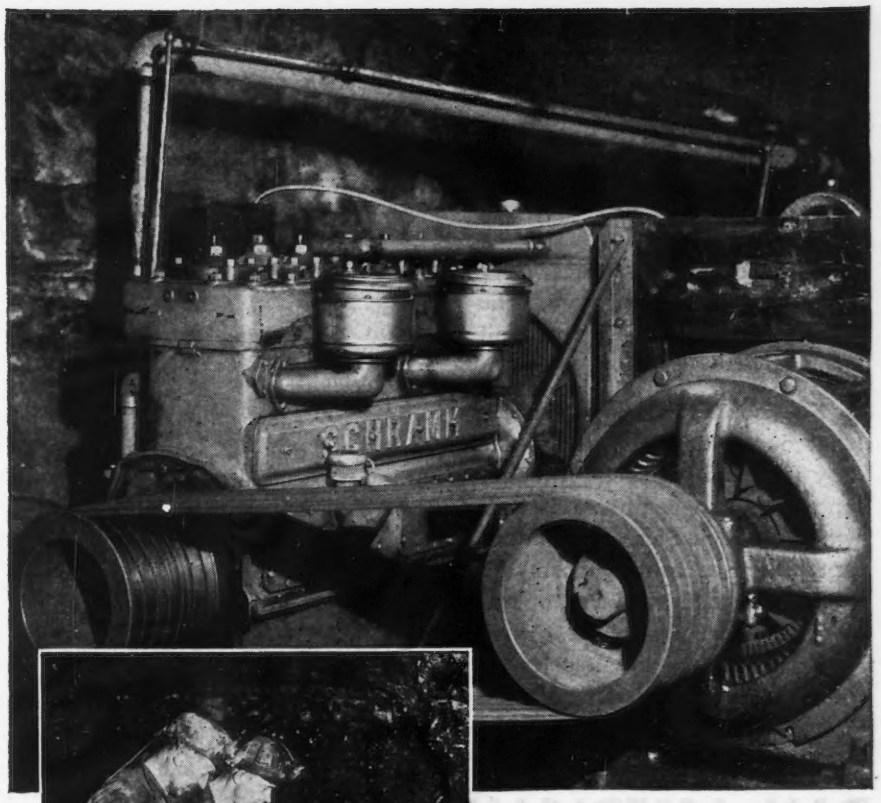
★Kennecott Copper Corp., parent of Utah Copper Co., on Aug. 16 filed suit in the local federal district court seeking a $37,814.22 judgment against the Utah State Tax Commission. Kennecott charged the commission with collecting the money by illegally taxing a federal mine subsidy paid to Kennecott for production during 1943. The tax commission, the suit charged, "erroneously added" a $3,781,421.55 federal subsidy to actual copper sales of $77,762,913.44 in levying a 1 percent occupational tax on gross sales of metal ores in Utah. Outcome of the suit will affect other Utah metal mines which plan to pay under protest taxes figured on a basis classing federal mine subsidies as income.

★Officers of district Union No. 2, International Union of Mine, Mill & Smelter Workers, together with presidents of local unions in Utah and eastern Nevada, at their quarterly board meeting Aug. 16 studied provisions of a wage award made workers by the national War Labor Board. The provisions had been released to MMSW officers in advance of their public release, with the specific warning to union officers that the award was not for public release at that time.

ARKANSAS

Hurricane mill in operation—Manganese output reduced—Zinc slack

S. & G., Inc., operating the Hurricane mine near Pindall, Searcy county, where operations are in charge of J. G. Shepherd of Harrison, have their new mill completed and in operation, although they had not yet reached full



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Arkansas (*continued*)

production in mid-August. They have opened a business office in Harrison.

★Production of zinc ore in the Northern Arkansas zinc and lead field has made no gains in the last thirty days. Only one car was shipped in July.

★Advance Mining and Engineering Corp., under the management of John Stone, of Harrison, is having to make some changes in its dry milling equipment. The company operates the North Star mine on Crooked Creek near Harrison.

★Hall Mountain Mining Co., in charge of J. C. Jones, of Yellville, is still closed down, but is negotiating with an Eastern chemical company for the sale of its high-grade carbonate lump ore. Good deposits of carbonate ore have been opened on the company's 1,200-acre tract, and operations will be resumed as soon as a satisfactory market is found.

★Production in the Batesville-Cushman manganese field in July and Early August was reduced somewhat on account of lack of labor; also due to the installation of new equipment in some of the washing and concentrating plants. Total production for the field in July amounted in 1,180 tons. Of this tonnage, 715 tons was low-grade, 115 tons second-grade, and 350 tons high-grade.

★Stanley Bourne and Ernest Stroud, of Batesville, operating the Austin property near Mt. Pleasant in Izard county, closed a deal early in August for a power shovel and will start operations as soon as the machine is delivered.

★Reed Denison and Alvin Hendricks have cooperated in prospecting with a churn drill on the Rogers property which lies between the Southern Hill and the Polk Southard near Cushman. They will test-drill six hills, on both sides of which there are ore outcrops.

★The E. and A. Mining Co., of Batesville, operating a beneficiation plant on the Bayou, which raises the grade of low-grade wad from in the twenties to as high as 40 percent, produced 200 tons of concentrates in July. One hundred and ten tons was high-grade and 90 tons second-grade. The mill was closed about 10 days in July to install some new equipment. Ore production comes from the Fenster and Reeves properties on the Bayou about four miles from Batesville. In order to increase ore production the company is also installing a drag line at the Fenster, and is building a bin from which trucks can be loaded by dumping instead of shoveling. These improvements will raise mine production to about 30 tons an hour. The mill will handle approximately 150 tons a day.

★Standard Mining and Milling Co., of Batesville, now has in operation the washing and concentrating plant on the Blake property, which was completed in June. Operation was delayed by inability to get a bulldozer or power shovel to handle the crude ore, which is disseminated in clay. A contract has now been made to obtain delivery of 200 to 350 yards of crude ore daily, using mules and fresnos.

WASHINGTON

Outlook for light-metal industry in Northwest depends on consumption

★The Electro-Metallurgical magnesium reduction plant at Mead is going onto a slowly curtailed production schedule. One hundred of the 1,800 employees were laid off the first of August following a cutback order from Kenneth B. Coleman, of Seattle, Regional Director of the WPB. He states that four other magnesium plants in tight labor areas have also been directed to curtail.

★Raymond Miller, Industrial Analyist of Bonneville Power Administration, said recently in Spokane that the size of the aluminum and magnesium plants in the future will depend largely on the development of small uses for those metals. The Spokane rolling mill will be limited, he said, in its distribution area to Western markets. If the West does not use the entire 120,000 tons of aluminum it can produce annually the mill will be forced to operate at a reduced rate and correspondingly higher cost. This might make it uneconomical. He suggested as possible uses transportation equipment, both aerial and ground, and kitchen utensils, pails, cans, barrels, lighting fixtures, refrigerator and range parts, and license plates. He said what is done in the next few years in these lines will have much to do with determining the city's position as an industrial point. Establishment of a clay-alumina plant to use the Spokane alumina deposits would supply the Mead reduction plant provided the $4,000,000 pilot plant under construction at Salem, Ore., proves the process to be sound. P. Evan Oscarson, Spokane District Engineer for the United States Bureau of Mines, said aluminum beds near Spokane are as large as those in Oregon and southwestern Washington.

★Officials of Aluminum Company of America have denied rumors of curtailment in production of aluminum sheets at the company's Trentwood plant. It is stated that the company is in position to expand quickly in the event of calls for increased material from aircraft manufacturers. J. P. Haight, works manager, is authority for the denial of curtailment rumors.

★Congressman Walt Horan, of the eastern Washington district, has stated that it is important that this country develop its own mineral resources rather than throw its influence at this time toward the development of resources of foreign countries. He said that in his opinion it is the business of the federal government to assist individual efforts to develop the mineral resources of the

Pacific Northwest. He visited the Buckhorn Mountain district and inspected the iron deposit which state geologists estimate will yield several million tons of magnetic ore. At present only about a carload a day is being shipped from these deposits.

★Production of lead, zinc, silver, and antimony ore is being made by the lessees of the Cleveland mine, 18 miles west of Springdale. Ned Spedden has a crew of four men, which enables him to work one shift. About 200 tons of ore is being broken and hauled 9 miles to the mill of Monitor Mines Co., from which the concentrates are shipped to the Bunker Hill smelter, at Kellogg, Idaho. With one shift the mill handles 35 tons a day. This mine is owned by Carr brothers, of Valley, and Forney brothers, of Springdale, who have given a lease and bond to Zeneth Mines Inc. W. H. Gaines and C. L. Clearwaters are chief owners in the Zeneth.

★Congressman Compton I. White stated recently in Spokane that 12 Republican and 15 Democratic senators signed the letter addressed to President Roosevelt, asking that the International Monetary Conference be required to fix parities in both gold and silver. He cited this as evidence that silver is not a partisan issue. Frank Lilly, president of the American Hard Money Association, at the same time stated that demand is increasing and production decreasing, which will ultimately cause the so called "great hoard of silver" to disappear.

★Northwest Mining Association, at an August meeting in Spokane, passed a resolution endorsing the investigation, proposed by Senator Arthur H. Vandenberg, of the SEC activities and their effect on the financing of small business.

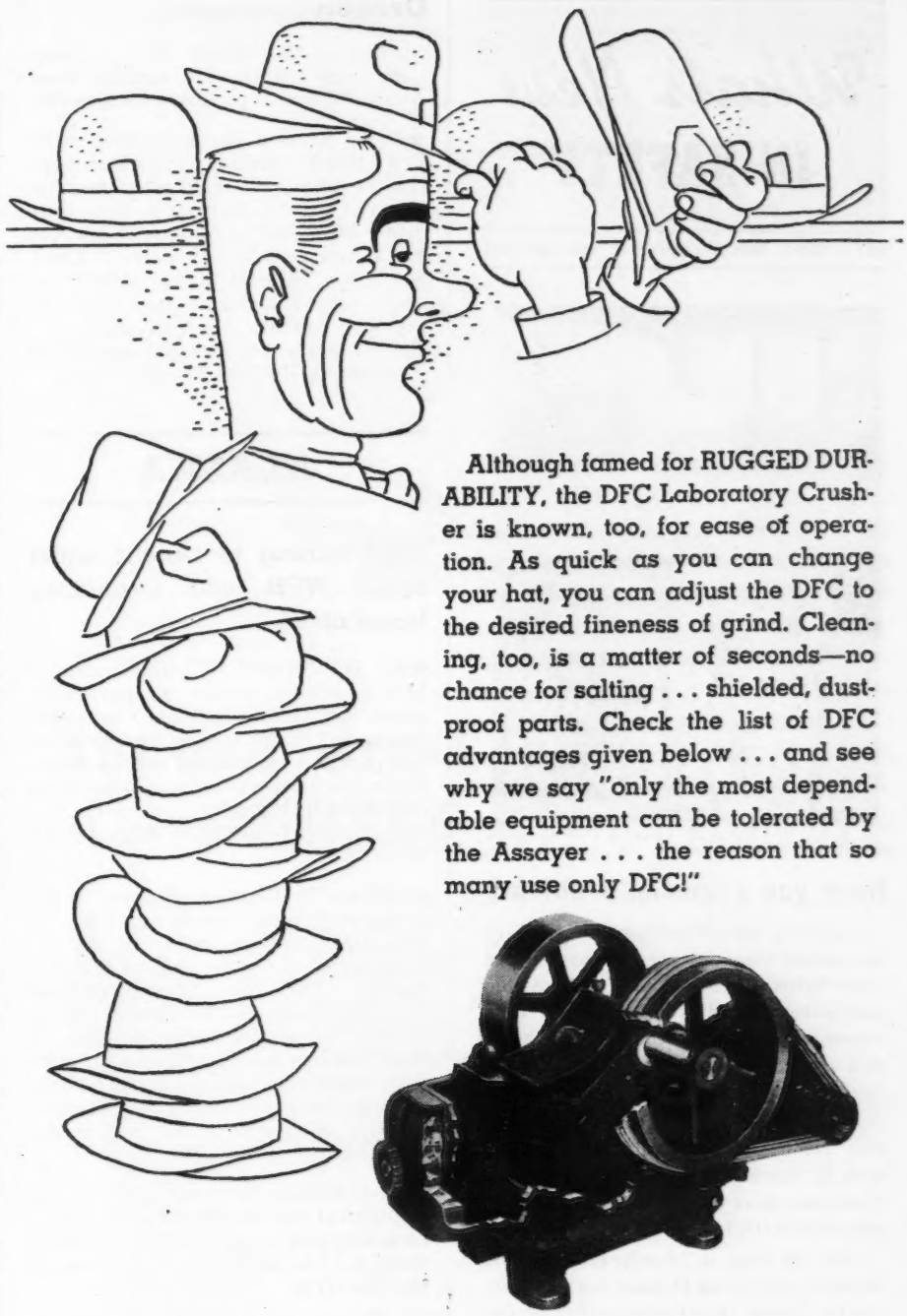
★Heidelberg Mining Co., of Pasco, is installing a large compressor plant, at Noxon, Mont., where it owns 17 claims. A tunnel and shaft have partly opened the property. George Myers is president and State Senator Charles F. Stinson is manager.

OREGON

Chrome ore shipments continuing to Metals Reserve at Grants Pass

★Early production is expected by the Union Silver Mining Co. at its Indiana mine, in the Grande Ronde district of Union County. The project is backed by interests at Yakima, Wash. A shaft has been sunk 250 ft., which is 75 ft. below old workings. Raleigh Chadwell, of LaGrande, Ore., manager, says the main orebody appears to have been opened at the present low level.

★John Robertson is shipping a good grade of chrome ore from the Illinois chrome mine, on the Illinois River, 18 miles west of Salem. The ore is



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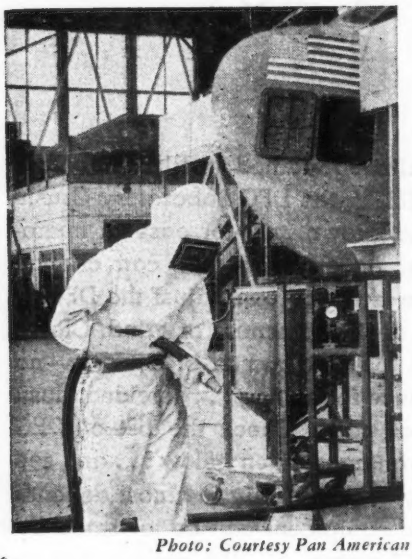

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EVERYTHING BULLARD IN SAFETY

Oregon (*continued*)

trucked to the Metals Reserve Corp. purchasing depot at Grants Pass. About 700 tons is produced each month.

★J. K. Remsen has four men under Ben Baker working the Sourdough chrome mine, on Baldface Creek, in Curry County. Remsen's first shipments amounted to 66 tons of low-iron ore running about 45 percent Cr_2O_3 which was shipped to the Metals Reserve depot at Grants Pass. He expects to produce a higher grade ore. This property was formerly owned and operated by Rustless Mining Corp.

ALASKA

Gold mining to benefit under recent WPB order permitting larger crews

★B. D. Stewart, Commissioner of Mines, who is acting as purchasing agent for Metals Reserve Corp., has announced that last year's program for the purchase of chrome ore on Kenai Peninsula has been resumed after being interrupted during the winter. The ore will again be delivered to the Jakolof depot.

★William E. Wrather, director, states that a preliminary report with maps on scheelite deposits in the Nome area has been prepared by the U. S. Geological Survey. These deposits were examined by R. R. Coats and William N. Laval, of the Survey, in 1943. Scheelite in that area has been found in connection with placer gold mining on many of the streams; also in lode deposits. A limited number of copies of this report are available.

★Joe L. Quigley has made a survey this summer of his interests in the silver, lead, and gold deposits in the Kantishna district. One of his mines is known as the Red Top.

★O. F. Weinhard expects to return to Candle, on the Seward Peninsula, this summer to prepare for winter drift mining on his claims. He probably will employ from five to seven men during the winter.

★In the period from July 1, 1941, to March 31, 1944, 56 U. S. mineral patents for 5,489.15 acres of ground in Alaska were issued. This is more than went to any other state or territory. Colorado was next with 55 patents; California, 48; Utah, 43; Nevada, 24; Arizona, 23; Idaho, 21; South Dakota, 16; Montana, 16.

★The refuge cabin of Alaska Juneau Gold Mining Co., on the summit between Sheep and Carlson creeks, recently burned to the ground, Joe Williams, superintendent, reports. It contained food supplies and material for repair of transmission lines.

★Arctic Circle Exploration Co. is employing most of its 250 men prospecting a large asphalt deposit near its gold-dredging operations. This summer the company is operating under permission from the WPB one gold dredge to enable it to partly pay operating expenses. This is the first operation of the company on its gold properties since gold mining was stopped in 1942. Prior to the war this company was the largest placer gold operating concern in the Territory, employing as many as 500 men. Gene Jack is superintendent.

★The board of regents of the Alaska School of Mines, at Fairbanks, has authorized the full curriculum to be available for the year 1944–1945. During the past year the Army occupied much of the school's floor space, making it impossible to do regular scholastic work. Dean Howard G. Wilcox will continue as head of the School of Mines.

★W. A. Richelson, mining engineer for Kennecott Copper Corp., has been studying metal mining and coal possibilities in the Anchorage area.

★Mining men of Alaska expect material benefit from the WPB's order allowing gold miners to employ larger crews. B. D. Stewart, coordinator of mines in Alaska, says crews from 14 to 200 men, if not employed men or men needed for essential industries, are used. Roy B. Earling, general manager and vice president of the U. S. Smelting, Refining & Mining Co., says the new order will permit that company to operate one dredge at Nome, and two at Fairbanks, perhaps as early as late this summer.

★Roy E. Jackson has been appointed Regional War Labor Board attorney for Juneau, which it is expected will expedite labor hearings in which mining men are concerned.

★Considerable activity is reported at Livengood, although not on a big scale. Work is being done at Livengood Placers. Fred Crane has a few men building a road to his ground on Olive Hill, at the head of Lillian Creek; Nick Mandich and Cecil Wells are busy on their claims.

Seven or eight men will be employed by Falls Creek Mining Co., between Lawing and Moose Pass, according to S. A. Leining, head of the company. He says a mill has been shipped from Seattle to the property.

YUKON

Yukon Gold Corp. hits low point in production and profits in 1943

★Yukon Gold Corp. reached a low point in its dredging operations in the Klondike in 1943. Operating profits were $479,896, against $1,307,786 in the previous year. Net profits in 1943 were $18,976, against $511,417. But in spite of the low production record, the

company reduced its debenture debt in 1943 by $214,500 and closed the year with a net working capital of $2,139,760. G. Goldthorp Hay, president, says labor available in 1944 is about 27 percent of what is required for full scale operations.

★Frank Freidel, miner of the Sixtymile district, is said to have acquired 22 claims on Upper Eldorado Creek belonging to Geanneret interests. He hopes to have some prospecting done this summer.

★Quite a number of men from British Columbia who have been working on the Alaska Highway have gone to a new gold discovery 80 miles east of the Alaska boundary. One of them reports an assay showing $190 a ton in gold. It is said this district never before has been entered by white men.

MICHIGAN

Opinion in Copper Country favors stockpile legislation and restoration of 4¢ import tax

★After careful consideration of the domestic copper situation the Mineral Resources subcommittee of the Upper Peninsula Advisory Committee has submitted a report to the Michigan Planning Commission, recommending the following governmental policies:

An Act of Congress, to be administered by a corporation such as the present Metals Reserve Co., which will provide among other things for a stockpile to consist of the following: All surplus copper and copper-bearing materials at present owned by the Government; all copper, in excess of requirements, acquired by the Government under war contracts; copper materials which the subcommittee suggests should be acquired by the Government due to the termination of its war contracts; and excess domestic production during the war.

The subcommittee urges that at the conclusion of the war this Government stockpile be frozen, and that an Act of Congress should be required to release any portion thereof. It also urges that the Government corporation be authorized to permit the stockpile material to be put into usable form, such as having it refined on toll, and to release for sale fabricated and semi-fabricated articles, provided that it purchases from domestic production an equivalent amount of material for the stockpile. It is the thought of the subcommittee that this procedure will provide against a collapse of the copper market, such as happened after the last war, and that the existence of a Government stockpile should not be allowed to constitute a threat against orderly development of additional reserves.

Taking a long-range view of the importance of a one-crop commodity, the subcommittee supports such legislation as is consistent with the national inter-

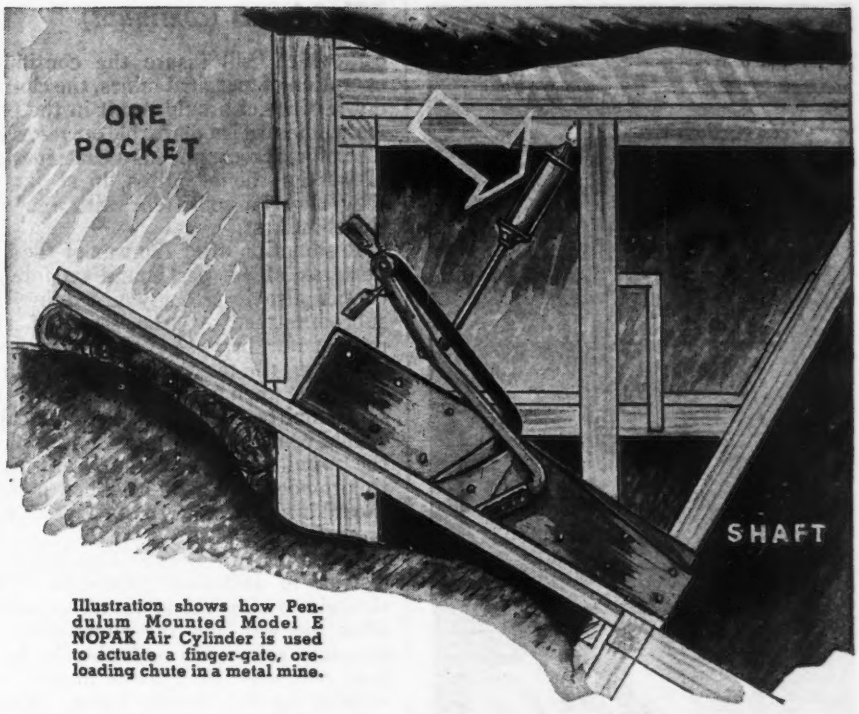
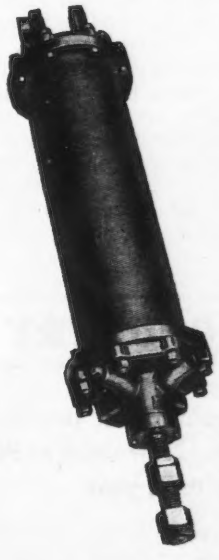


Illustration shows how Pendulum Mounted Model E NOPAK Air Cylinder is used to actuate a finger-gate, ore-loading chute in a metal mine.

Reduce Ore-Loading Costs ...with NOPAK Air Cylinders



NOPAK MODEL E Air Cylinder with Pendulum Mounting. NOPAK Cylinders, both Regular and Heavy Duty are available in 6 Standard Mountings to meet practically all application requirements.

The illustration shows how a heavy-duty NOPAK Air Cylinder may be used to operate a finger-gate loading chute which controls the flow of ore from the ore-pocket to cars or skips. It is typical of the many uses for NOPAK Air Cylinders in ore-handling and *loading* operations.

Mine operators are finding that air cylinder power provides decided advantages over manual or mechanical methods in the operation of heavy doors, bin slides and chute gates. Here are a few of them: —

- Minimizes the hazard of uncontrollable ore-flow from bins, pockets or chutes.
- Keeps haulage ways clean by preventing spills.
- Promotes speedy loading of cars or skips, reducing cost-per-ton of ore moved.
- Reduces maintenance cost of loading chutes.
- Danger of injury to chute tenders is minimized.
- NOPAK Air Cylinders, controlled by NOPAK Cored-Disc Valves, are easy and economical to operate.

Of course, there are many other uses for NOPAK Air Cylinders and Valves in mining in addition to the safe, efficient, low-cost control of loading chutes. Let us help you with the successful application of air-cylinder power to lifting, lowering, pushing, pulling or clamping operations.

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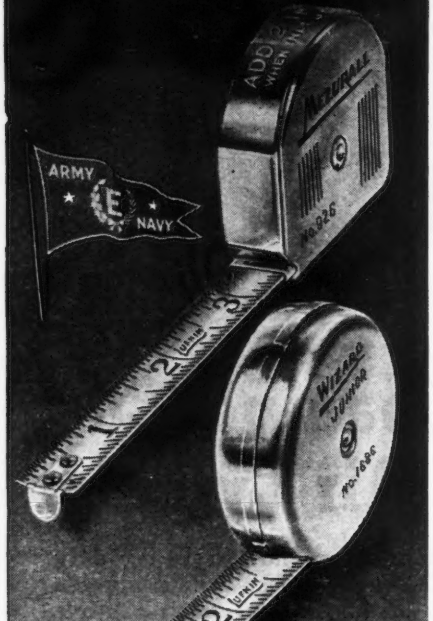

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Michigan (*continued*)

est, which will insure the continued operation of marginal mines, the closing down of which would result in the permanent loss of irreplaceable ore reserves. Therefore it recommends a continuation of wartime bonus prices, in so far as they may be consistent with the national interest.

Resumption after the war of the import tax of 4c. per pound on foreign copper also is strongly urged by the subcommittee. At the start of the present war, because of the urgent need of copper, the tax was done away with. However, when the emergency ends, the subcommittee says the tax automatically should come back into existence unless the Administration, through an effort to promote the good-neighbor policy, should bring pressure to bear upon Congress to repeal it.

The Michigan Copper Country is a district of high-cost producers. The struggle to keep the mines in operation after the war and the elimination of premium prices will undoubtedly be a hard one, even though the import tax remains on the statute books. There will be little hope for the continuation of copper production in the district, the subcommittee says, if the mines are compelled to compete, not only with the lower cost domestic producers, but also with the extremely low-cost foreign production.

★A number of furloughed soldiers who had been assigned by the Army to work in the Calumet & Hecla mines recently were called back into active service. In addition, a number of young men under 26 years of age have been called into service and more are awaiting call. Their departure has caused a serious manpower shortage and is one of reasons why Ahmeek No. 4 shaft of Calumet & Hecla, also the Allouez and Iroquois, have been placed on a two-shift basis.

IRON COUNTRY

Iron ore consumption proceeds at record rate—New dock at Port Arthur ready next year

★Two minor changes in the regulation covering iron ore produced in Minnesota, Wisconsin, or Michigan were announced recently by the Office of Price Administration. They involve the pricing of special ores not specifically named in the regulation and the pricing of such special ores not previously produced. The changes were effective July 22, 1944.

Consumption of Lake Superior iron ore in June was 7,112,060 gross tons, compared with 7,557,762 gross tons in May, and 6,939,998 gross tons in June, 1943, according to Lake Superior Iron Ore Association. For the first half of 1944 consumption totaled 44,290,230 gross tons, compared with 44,092,720 gross tons in the same period in 1943. Stocks of iron ore on hand July 1, 1944, were 26,655,414 gross tons, compared with 26,098,245 gross tons July 1, 1943.

Iron ore is being shipped steadily from the four mines active on the Vermilion range in Minnesota. Of these, Oliver Iron Mining Co. operates the Pioneer, Sibley, and the Soudan mine, and Pickands, Mather & Co. the Zenith. These mines are well-established producers, all over a half century old.

Port Arthur, Ont., is destined to be the eighth port for loading Lake Superior iron ores. A new dock is being built by Canadian National Railways to serve the Steep Rock iron mine, Atikokan, Ont., 140 miles west of Port Arthur. The foundation piling has been driven and the pouring of concrete has been started. Completion is now set for the opening of the ore season in 1945. The dock, exclusive of approach, is to be 600 ft. long, with fifty 300-ton pockets on each side.

★At the Carey mine, operated by Pickands, Mather & Co. at Hurley, Wis., the Austin Co. has completed its contract for erecting the mine building. This structure is U-shaped, with the open end facing the shaft. The exterior is of red brick and glass blocks. Most of the interior is covered with an easily cleaned, brown glazed tile. Change rooms are on the east side, the engine house, with hoists, compressor, and distribution panels is on the south, and the west wing contains the cage hoist. This hoist will be used in placing the steel sets as the borehole is stripped down to full shaft size. Stripping will start when the steel headframe is completed. Foundations for the latter are almost ready.

★Three new 15-ton Euclid trucks equipped with superchargers have been received at Cleveland-Cliffs' open-pit Tilden mine, at Ishpeming, Mich. With the two on hand these will haul ore from the upper and lower benches while the steam locomotives in service are used for the orebody on the crusher plant level. This mine draws from five orebodies, two west and three east of the crusher. For testing purposes, one new truck was equipped with a hydrotarder and can haul 15 tons of ore down a 10 percent grade at any safe speed without using the brakes. When brakes are applied, the load can be stopped in half the length of the truck without skidding. H. O. Moulton is superintendent.

★The celebration of the centennial of the discovery of iron ore on the Marquette Range, which began in Negaunee, Mich., in June, was concluded Aug. 20. Many visitors were attracted, including the Upper Peninsula Section of the American Institute of Mining and Metallurgical Engineers. The members met at Ishpeming, on Aug. 10.

★At the Blueberry mine, 10 miles west of Ishpeming, Mich., operated by North Range Mining Co., the main shaft is being deepened 200 ft. To eliminate part of the manual labor of mucking, a power scraper operated by a double-drum slusher set on top of the cage is

used to load the car on the cage. With this combination a footage of 5 ft. per day is maintained using six men on each of the three shifts per day. Guy Nault is superintendent.

★Tonnage of iron ore shipped in July from the Lake Superior ranges to Lower Lake ports was 12,908,972 gross tons, compared to 13,523,313 tons a year ago. Total for the season to Aug. 1 is 42,285,902 tons, compared with 38,382,704 tons for the corresponding period in 1943, due to the earlier opening of navigation.

COLORADO

Nonmetallics growing in importance in mineral output of the State

★A Humphreys spiral gravity concentrating plant is being erected in the St. Elmo district by the A. J. McKenzie Construction Co., of San Antonio, Tex., and the Minerals Recovery Co., joint business venture of the Victoria Gravel Co., of Houston, Tex. The operators intend to re-treat the tailings of the Mary Murphy mill, which have been sold by the trustee for $25,000 payable at the rate of $1 per ton for material removed until the total sum is paid. The trustee for the Mary Murphy holds approximately 50 claims. Production from this property between 1913 and 1916 was just under $2,000,000 in gold, silver, zinc, lead, and copper. J. G. McKenzie is resident manager for Minerals Recovery Co. at St. Elmo.

★Resurrection Mining Co., Leadville, is treating custom ore to the extent of about 30 percent of its capacity, which will be materially increased by alterations now under way. M. E. Newlove is manager at Resurrection and Kenneth L. Tatman is mill superintendent.

★On July 29 the Leadville tunnel had been driven to a point 2,125 ft. from the portal. The first solid rock in the tunnel bottom was struck at 330 ft., but the tunnel was not completely rock-inclosed until about 700 ft. had been driven. Timbering had to be continued for some distance beyond that point, because the gently sloping bedrock did not yet provide a safe cover for an unsupported opening.

★Colorado produced 20,660 tons of feldspar in 1943, valued at nearly $89,000, or $4.29 per ton crude ore. The outlook for feldspar is favorable, notwithstanding competing products such as aplite and nepheline syenite. The use of glass for structural and other purposes, and its application in place of steel, rubber, tin, lead, copper, brass, and plastics, will tend toward permanent markets for feldspar. Porcelain products, a large market for feldspar, are also replacing some of the metals. Present curtailment of certain consumer products using feldspar is expected to result in increasing demand after the

Under Corrosive Processes Amsco Alloy Stands Up . . .

Resistance to corrosion is imperative for many equipment parts if frequent replacements and high maintenance costs are to be avoided. Through use of the proper grade of Amsco Alloy we have been able to furnish "chemical process" plants with castings which have stood up under corrosive conditions for far longer periods than the parts which they replaced.

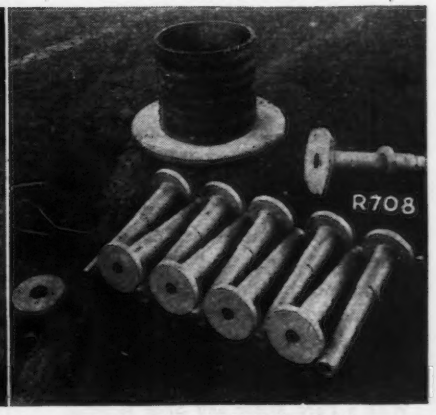
Picture C-528 shows pistons of Amsco Alloy F-8, for resisting corrosion in the hot oil pumps of an Illinois refinery. This alloy, which contains 20-22% chromium and 8-10% nickel, is primarily employed to withstand erosion, pitting, etc., from the corrosive action of acids, acid solutions and gases; and is also serviceable under temperatures up to 1600° F.

Picture C-622 shows some valves and valve bodies employed by an aluminum producer in handling corrosive liquids. These castings are of Amsco Alloy F-10, containing 26-28% chromium and 10-12% nickel, which is also an excellent corrosion resistant metal in many uses and is, additionally, more efficient under high temperatures than F-8.

Picture R-708 shows several of a number of Amsco Alloy parts for the wood pulp digester at a sulphite paper mill. An excess of free sulphur dioxide in the solution makes it essential that the metallic fittings of the digester be made of a corrosion resistant material, like the Amsco Alloy F-10N formula, which contains approximately 29% chromium and 9% nickel.

If you have a corrosion problem, with or without the incidence of high temperatures, where castings can be used, it will prove profitable to consult Amsco.

Bulletin 108 describes all applications of Amsco Alloy.



Advantages of Amsco-Nagle Centrifugal Pumps described in Bulletin 940.

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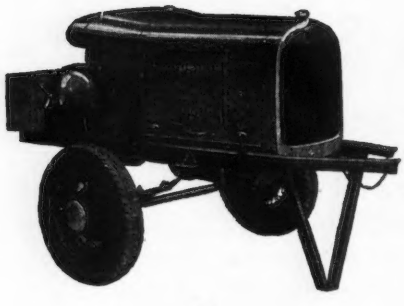

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Colorado (*continued*)

war. The recovery of feldspar by froth flotation, with separation of quartz, will permit of less selective mining and greater economic recovery of feldspar. Colorado now ranks third among the States in production of this nonmetallic.

★The fluorspar mill owned and operated by Kramer Mines, Inc., located about nine miles northwest of Salida, was destroyed by fire July 5, with an estimated loss of $65,000. This flotation mill, built in 1942, was producing fluorspar concentrates used in the manufacture of steel and aluminum. Raymond V. Kramer, president of the company, hopes to rebuild a modern mill.

★S. A. Mock, H. W. Patton, and E. L. Knox, operating a leasing partnership on the Black Prime mine of the M. P. Tungsten Co. in Black Tiger gulch near Boulder, are producing about five tons per day of tungsten ore. E. L. Knox is superintendent of the operation.

★The Urad molybdenum mine at Empire, Colo., is now in production. New installations include a high-tension power line to the property and an underground primary crushing plant connected by motor haulage through the main tunnel to the secondary crushing plant and surface concentrator. The winter problem at 10,000 ft. elevation has been solved by insulating the steam-heated surface buildings with asbestos protected metal. Max Hirsch, New York City, is president of the Molybdenum Corporation of America. Whitaker and Schlereth, Denver, were consulting engineers during construction of the plant.

★The Burleson mine of the Raymond group near Ohio City has been sold to W. U. Cowan for $23,482. This gold property, developed originally by Pennsylvania capital, has produced intermittently for nearly fifty years. It was one of three major tunnels projected into the gold belt between Gold Creek and Pitkin, and penetrated the same ore veins as the Carter and Gold Links. The new owner is making plans to resume operations when gold mining is again permitted at the close of the war.

★All of the property and assets of the Hope Mining, Milling and Leasing Co. near Aspen have been sold by G. W. Palmer, receiver, to the Midwest Mining Co., Aspen. The property consists of 11 patented claims and some fractions.

★Earl Alexander has been trucking the lead-silver ore stripped from the Lost Day mine above Ironton last season. This vein in the San Juan range is three feet wide and can be stripped from the surface over a considerable distance. The property was formerly operated by tunnelling.

★C. L. Martin, operating the Martinette Mining Co. above Montezuma, is shipping 10 tons of zinc-lead-silver ore daily.

★Harry Dustin and Shirley Johnson have reopened the Sangre de Cristo tunnel on Tenderfoot Hill, Cripple Creek. The property, leased from Mrs. Verner Z. Reed, has not been operated for nearly two years, although in ore when it was closed. The leasers expect to do some retimbering and development work.

★O. B. Willmarth is mining a body of lead-zinc ore previously developed on his Grizzly Gulch mines in the Mt. Kelso area at Graymont, near Georgetown.

★Hayden Mining Co., producers of strategic minerals for war purposes, will use the Humphreys spiral concentrator in milling about 25 tons per day of lepidolite-microlite from the Derby mine in Gunnison county. Microlite is a tantalum-bearing mineral, while lepidolite is a lithium-bearing mica, both used in the war effort. Company officials expected the new mill to be in operation in early August.

★L. D. Lankston has renewed his lease on the Continental mine located in the Vulcan country south of Gunnison, and will continue development work.

NEVADA

Continued activity in tungsten production—Development work resumed at the St. Elmo

★Equipment is being assembled for construction of a 100-ton scheelite concentrator at the Riley tungsten mine, in the Potosi district, Humboldt County, operated by the Northern Nevada Mining Co., a partnership composed of Joseph E. Riley, chief owner and manager, with Harold H. Luce and Don Burgner, all of Reno. Between May 1, 1943, and June 30, 1944, when price contracts were abrogated, the Riley mine, two miles south of the Getchell gold mine and tungsten plant, delivered over 80,000 tons of scheelite to the nearby Metals Reserve stockpile. The Getchell 400-ton concentrator treated some 10,000 tons of stockpile ore, in addition to the product of its own tungsten claims, and around 80,000 tons of ore remains in the stockpile, with no provision for its disposal, now said to be the largest stockpile of tungsten ore in the U.S. The Riley ore has been produced from 10 open cuts and the mine is said to have some 100,000 tons of ore in sight. The U. S. Bureau of Mines will shortly undertake drilling on the property.

★Production of the Bristol Silver Mines Co., with long-productive silver-lead-copper-manganese mines in the Jackrabbit district, 18 miles north of Pioche, is to be substantially increased, a new access road having been completed to the mine. Ore has been conveyed by a 9,000-ft. aerial tram to a narrow-gage railroad and transferred to standard-gage at Pioche for shipment to the Com-

bined Metals Reduction Co. plant at Bauer, Utah. It was indicated the new road will enable trucking of ore to main-line cars at Pioche. J. H. Buehler is manager at Bristol and E. J. Snyder, of Salt Lake City, is president.

★Churn drilling equipment has been moved by a contractor to property of the Mountain City Cons. Copper Co., embracing the western part of the gossan-capped copper belt from which the adjoining Rio Tinto mine of the Mountain City Copper Co., an Anaconda unit, has produced high-grade copper ore during the past ten years for its 350-ton flotation mill and for direct shipment to the International smelter in Utah. Several deep holes are to be drilled in an area where surface stripping with bulldozer has exposed three parallel ore zones, with the intention of sinking a main working shaft. Earlier work, several hundred feet distant, including two tunnels and a 200-ft. inside shaft, opened substantial widths of ore of concentrating grade, but has been above the water table and above the horizon of the Rio Tinto orebodies. George B. Thatcher, 206 Virginia St., Reno, is president and M. E. Bohannan is in charge at Rio Tinto camp.

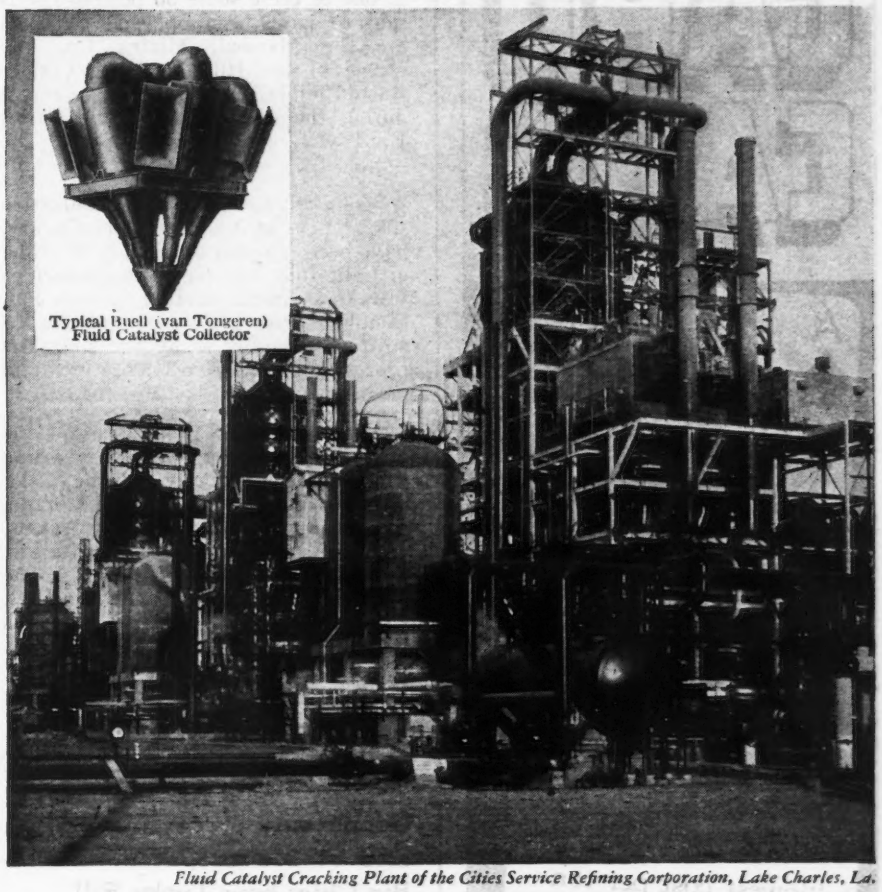
★Development work has been resumed, with WPB permission, by the St. Elmo Mining Co. on its gold property in northern Elko County, midway between Jarbidge and Mountain City. E. J. Heiner, of Elko, is manager. Before closing down in 1942 the company had accomplished over 1,000 ft. of underground work, exposing good stoping widths of mill ore with some high-grade. Plans for construction of a small mill are under way.

★Tungsten concentrate of a high degree of purity is produced by the 80-ton plant of the Nevada Scheelite, Inc., near Rawhide, Mineral County, and is shipped for final processing to a calcining and chemical plant operated in southern California by the Mills interests, owners of Nevada Scheelite. The Rawhide operation has continued for eight years. Orebodies developed through a 200-ft. shaft are said to be up to 40 ft. width on the lowest level, and drilling by the U. S. Bureau of Mines has met with good results. Oscar L. Mills is president and A. J. Mills s in charge at Rawhide.

★Production of magnesium metal by Basic Magnesium, Inc., has been reduced to 40 percent of capacity by a WPB order to close down two more units, leaving four in operation out of the total of ten that were in production early this year. The four units still require a force of 2,600 employees to produce the 4,500,000 lb. of magnesium assigned to the plant. Capacity production of chlorine will continue, and $350,000 has been allocated to the Anaconda-operated concern to develop postwar uses for magnesium in industry. F. O. Case is general manager at Henderson.

★Three mines in the Contract district, northern Elko County, are producing copper ore, containing silver and gold,

CATALYST RECOVERY



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Nevada (*continued*)

for shipment to smelters in Utah, and in one of these some 30 percent ore is said to have been opened. Shippers are the Marshall Mining Co., the Queen of the Hills, and the Copper Button mines, all of which were active during the first World war. Charles E. Taylor, of Wells, is one of the producers.

★Waste dumps on once-productive silver mines at Austin, Lander County, have been sampled by Fred A. Gowing, of California, who has been conducting tests to ascertain whether the material, sampling around $2 per ton, can be treated with success by the sink-float process. He said results were still inconclusive.

★Large tungsten properties in the Nightingale district, western Pershing County, held formerly by the Gold, Silver & Tungsten, Inc., of Colorado, have been awarded to James A. Adams, of New York, as the outcome of a suit brought in the district court. The company was headed by the late J. G. Clark, of Boulder, Colo. Adams was reported to be a producer of tungsten.

TRI-STATE

Geophysical survey planned on area at Melrose, Kan.—Davis-Big Chief buys Lucky Bill

★Further depletion of Tri-State mines was brought to the fore during August. This was evident from the statistical viewpoint by a degressive tendency in the production rate and in a definite shifting in managerial personnel of several large companies operating in the district. From the latter point of view, chief interest was centered in the resignation of George W. Potter, of Joplin, as executive vice president and general manager of the Eagle-Picher Mining & Smelting Co., the district's largest producing company over a period of many years. Potter's resignation, effective Sept. 1, was followed by that of G. C. Niday, Tri-State manager of mines and mills for the company, who started with the company in 1915 and played a leading part in its subsequent growth and expansion. Gloyd M. Wiles, of Baxter Springs, general mine superintendent for the St. Louis Smelting & Refining Co. in the district, was transferred late in August to the McIntyre titanium-iron property of the Titanium Pigment Co. in New York, which also is a subsidiary of the National Lead Co. I. V. Korts, also of Baxter Springs, a mining engineer for the Federal Mining & Smelting Co. in the Tri-State district over a 20-year period, resigned the first of the month to accept a position with the Western-Knapp Engineering Co. at Malvern, Ark.

★The U. S. Bureau of Mines is preparing to conduct a geophysical survey of a 20-mile-square area south of Melrose, Kan., and bordering both sides of the Kansas-Oklahoma state line. Information to this effect came from Clinton Knox, mining engineer for the project, who also was assigned to the preliminary development, principally dewatering, of the Park-Walton lease in the Melrose district, 6 miles west of the Picher field. D. G. Harrison, of Joplin, district manager for the United Zinc Smelting Corp., reports that the company is showing progress in the mine development work on its Park-Walton lease. The company has completed its No. 2, or mill, shaft to the 310-ft. level, and has connected it underground on that level with the No. 1 shaft, which was sunk more than a year ago and is situated about 360 ft to the northwest of the No. 2 shaft. In connecting the two shafts, drifts were cut out to the east from No. 1 and to the north and west from No. 2 to open the upper level of the orebody. Ore from this development work has been pulled at the No. 1 shaft and trucked to the company's Royal mill, in the southeast part of Picher, for treatment. The upper run of ore has been high in lead proportionally to zinc. The company now is handling about 2,500 gallons of water from three 150-hp. direct-connected Pomona pumps—each with 12-in. bowls and 9-in. discharges and installed in drill holes—to keep the water below the drift workings. Preparations are being made to install a booster pump to lower the water table for sinking the No. 2 shaft to the 350-ft. level. The No. 1 shaft already has been put down to the 352-ft level. A derrick and 300-ton hopper have been built over No. 1, and similar units are nearly completed at No. 2. Company plans for the construction of a mill on the site probably will be announced in the near future, Harrison said.

★Davis-Big Chief Mining Co., which recently acquired through purchase the Lucky Bill lease of the Federal Mining & Smelting Co., south of Cardin, has inaugurated expanded mine operations on the property, according to Claude Jones, of Picher, company manager. The derrick and hopper, constructed and used by the Federal company the last few years, was remodeled preparatory to increasing the ore tonnage output at the mine, Jones said. Mechanical loading equipment also was installed to build up the tonnage. A railroad spur off the N.E.O. railroad has been built from the Eagle-Picher Hum-bah-wat-tah No. 3 shaft, a quarter-mile to the southwest, and ore is being hauled to the Central mill for treatment. The Lucky Bill property has been one of the many outstanding leases mined by the Federal company in the Picher field.

★J. V. Reynolds, of St. Louis, has purchased the tailing plant of the Sciota Milling Co., east of Webb City, according to Sam A. Smith, manager of the company. The mill, which was built and placed in operation in 1941, was shut down last March. Associated in the company with Smith were Howard Saunders, Clyde and Wilmer

Ingram, Mrs. Helen Sanford, and James L. Smith, Jr., all of Baxter Springs. The deal, for which the consideration was announced, was promoted by Pat Tabor, of Joplin, who was instrumental in the formation of the new company—known as the Webb City Custom Mill Co.—which now is operating the plant. Tailings are being retreated from the Aylor land in the old Prosperity mining area, which is held under lease by Luther Eakens, of Carterville.

★The sudden collapse of a 70-ft. steel derrick and hopper at the Hum-bah-wat-tah No. 3 mine of the Eagle-Picher Mining & Smelting Co., near Cardin, Okla., on July 24, resulted in the death of George F. Brown and Everett E. Sikes and the injury of Harold Connelly and Floyd L. Murray. The cause of the accident is not fully known, but apparently one of the steel legs of the 400-ton hopper buckled and gave way, bringing down the whole structure.

MEXICO

Inadequate transportation and fuel supply hampering operations

★The labor strike that began on June 8 against some 140 companies and individual operators, was finally ended August 11. The last settlement was made with the San Luis Potosi plant of the American Smelting & Refining Co., allowing a daily pay rise of 55 centavos retroactive 30 days from signing the agreements; payment of 45 days wages during the strike; and 55,000 pesos for establishment of a consumption cooperative. The Labor Ministry announced that, with the strike settled, a general increase in mineral production at most of the properties involved was expected.

★Mining has been normalized as far as work is concerned with settlement of the strike that began on June 8, but present conditions in the industry are not of the best, finds the National Bank of Mexico, the country's largest private bank, in a review of the Mexican economic situation. The review puts into print a general consensus about mining. Among the industry's chief difficulties it points to agitation by mining labor leaders, increasing costs of production, lack of modern equipment, very frequent demands for pay increases, and ceiling prices on a wide range of metals and minerals that largely prevent companies and operators from attaining a protective margin. Mining has reached a crisis, the Bank says, that is demonstrated by the falling off in production, although no figures are given. Mining, says the report, has been spared increases in freight rates and combustibles prices, but costs of chemical products and raw materials have increased to a great extent. Iron products, cement and

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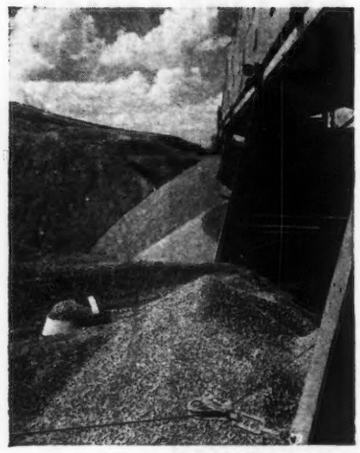

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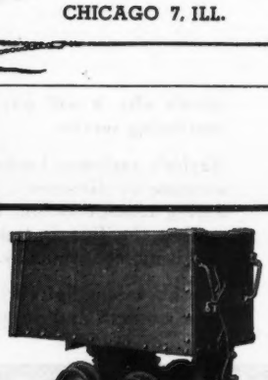

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Mexico (*continued*)

wood are now mining's most expensive items, the report finds. It added that mining pay has been raised 40 percent and taxes on the industry are many and increasing.

★The National Railways, Mexico's largest railroad, has started to give mining better export service with the reconditioning for faster movement of heavier trains of the division between Torreon, Coahuila, and Chihuahua City, Chihuahua. The commission of American rail experts headed by Oliver M. Stevens, that has been working for the Railways' rehabilitation for some time, is aiding this reconditioning. So as to maintain the morale of miners, attention is being given mining communities in the federal government's program of improving and expanding drainage and tap water facilities in places where that is required and providing such facilities in towns that lack them.

★Mining is virtually at a standstill in the Balsas sector of Guerrero because of the utter lack of transportation to move its products to home and export markets, according to the Mining Chamber of Mexico. This situation results from the National Railways' inability to provide enough cars and locomotives to haul them, and the paucity of trucks to convey the ore to places where there are adequate rail facilities. This situation, the Chamber said, is causing severe losses and has deprived numerous miners of employment. Appeals for relief have been made afresh to the federal government. The Ministry of Communications and Public Works is seeking a remedy to the situation which has prospects of becoming worse.

★Settlement of the strike, on the basis of arrangements with each company and the union, made an interesting study. They were, in the case of the major companies, amounts in pesos, the current worth of which is 4.85 per U.S. dollar:

Penoles, four units, two in Nuevo Leon, the others in Coahuila: payment of 300,000 in wages during the strike and 20,000 as costs of the movement; Mexican Candelaria, Contraestaca, Sinaloa: 50-centavo (half peso) daily pay rise, 75 percent of wages, 3,250 costs; San Carlos unit, Chihuahua, of the Cia. Minera Nacional: 45-centavo raise, half wages, 6,270 costs, 5,000 for social services, flat indemnification of 600 pesos for deaths from non-professional diseases, and two additional days of paid annual vacations; Moctezuma Copper, Nacozari, Sonora: 50-centavo rise, with the stipulation that it will be cancelled if the price of copper drops below 11.5 cents (U.S.) the pound, full wages, 35,000 costs; Fresnillo, Fresnillo, Zacatecas: 55 centavos, 475,000 for wages, costs and various social services; Altos Hornos, S.A., Monclova, Coahuila, and the Cia. Minera El Zinc, Taxco, Guerrero: ten to fifteen per cent pay rises; American Smelting: An-

gangueo unit, Michoacan: 45-centavo rise, 6,000 costs, 24 days wages, 50,000 pesos to organize a consumption cooperative society; Monterrey unit, Neuvo Leon: 60-centavo rise, 5,000 costs, 97,000 as wages; Parral unit, Chihuahua: 55 centavos, 60,000 each for a consumption cooperative society and a medical clinic for employees and families, 5,330 wages; Santa Eulalia unit, Chihuahua: 50-centavo rise; Cananea Consolidated Copper, Cananea, Sonora: 65 centavos, 250,000 as wages, 25,000 for life insurance, 6,000 for a medical clinic and 500 a month per 100 employees for medicines.

★Work peace was attained by the Cia. Minera de El Boleo, S.A., Auguste Nopper, general manager, the French-owned copper mining enterprise at Santa Rosalia, Baja California, with a pact that allows no pay rise but gives a 50-centavo bonus for each extra meter extracted per shift, and payments of 25,000 pesos for a consumption cooperative, 13,600 for pensions and 2,500 each for life insurance.

★Miners of Pachua, Hidalgo, including members of the Dos Carlos and San Rafael cooperatives, were to hold a convention in Pachuca late in August for the purpose of arranging more harmonious relations with their employers. Officials of the Labor Ministry, labor organizations and labor senators and congressmen have been invited to attend.

★Mexico's first national convention on tuberculosis and silicosis, held in Mexico City July 23 to 29 under auspices of the Mexican Society for Studies about Tuberculosis and Silicosis, adopted the following resolutions that directly refer to mining:

Amending the federal labor law to limit the service term of miners suffering from silicosis so as to prevent them dying from that disease; outlawing dry rock drilling in mines in favor of the wet method; use of powdered aluminum as a silicosis prophylactic; and establishing a national institute to attend all phases of dealing with both diseases. The delegates, among whom were several North and Latin Americans, visited the silver mines at Pachuca, Hidalgo. The meet selected Mexico City as the site of the second national convention on the same subjects which is to be held in 1946 at dates that the Society will later announce.

★Mexico's mining production in 1943 was worth 751,000,000 pesos, announced the National Statistics Department. This value was 756,000,000 pesos in 1942, peak year for the buying abroad of strategic mining products, and 622,000,000 pesos in 1941. The Department reported a decrease in the value during the first 1944 quarter: January, 35,000,000 pesos, compared with 74,000,000 in the same month of 1943, 78,000,000 in 1942 and 59,000,000 in 1941; February, 34,000,000, as against 66,000,000, 58,000,000 and 50,000,000 in 1943, 1942, and 1941, respectively. The report said that the value increased somewhat in March, but did not give figures, but was lower

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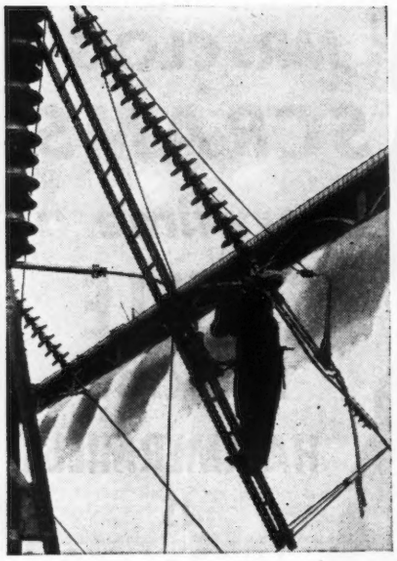

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Mexico (*continued*)

than that for the previous March and almost equal to that of March, 1942.

★Cia. Minera de Santa Maria de la Paz y Anexas, Matehuala, San Luis Potosi, was again obliged to suspend operations because of the lack of fuel oil. The company informed the Labor Ministry that it was in no way responsible for this shutdown that made 1,250 employees idle for several days. The company was able to resume work when fuel oil was rushed to it. Petroleos Mexicanos, the official oil company, expects to correct the shortage of fuel and other oil and gasoline that has hit mining and general industry as well as agriculture, hard in various regions, with the building of pipelines. The National Railways, Mexico's largest railroad, is cooperating in the building of some of these oleoducts. In reporting that lack of fuel oil had obliged it to suspend all operations, the Cia. Minera Panuco, S.A., Sinaloa, told the Labor Ministry that it would be unable to pay wages during the shutdown because the closure was not its responsibility as both Petroleos Mexicanos and the Southern Pacific Railway of Mexico had failed to deliver it the required fuel.

★President Manuel Avila Camacho has instructed the national commission for stimulation of the mining industry to arrange for exploitation of an important iron deposit recently discovered in the Minatitlan region, Colima.

★A presidential decree exempts mining and other cooperative societies from payment of the federal stamp fiscal tax for five years.

★Ing. Gustavo P. Serrano, for long president of the Mining Chamber of Mexico, who was recently appointed Secretary of National Economy, told Leopoldo Zamora, Jr., president of the National Cooperative Confederation of the Mexican Republic, that he sympathizes with the cooperative movement and that his ministry, which has jurisdiction over these societies, will do all possible to aid them. Secretary Serrano mentioned the success of the mining consumption cooperatives in making that promise.

★One mining company, Cia. Minera Las Amarillas, Mazapil, Zacatecas, won a strike when the federal board of conciliation and arbitration ruled that the movement was illegal because it started before the end of the term it had allowed for discussions of the workers' grievances. The workers obeyed the board's order to immediately return to their jobs.

★Employees of the Cia. Minera El Zinc, S.A., Taxco, Guerrero, John C. Crosby, superintendent, returned to the firm 1,500 tons of zinc and 1,500 tons of lead they had seized to guarantee the company's meeting their wage and indemnification claims. The demands were met with the settlement of the strike against the company.

★The New York Supreme Court

authorized W. E. Ernst, liquidator, to grant L. E. Whicher, of New York City, a $1,255,000 option on the Candelaria mine, in Durango, Mexico, during liquidation proceedings of the New York Candelaria Co. Ownership of the property has been contested in Mexican courts since 1886, when the property was unlawfully seized. By two Mexican court decrees, in 1931 and 1938, full ownership of the property was restored to the New York Candelaria Co. Since these decrees were never put into execution, Mr. Whicher is now undertaking necessary action to secure title and possession.

CANADA

Metal output reflects manpower shortage—Area east of Noranda and Beattie under exploration

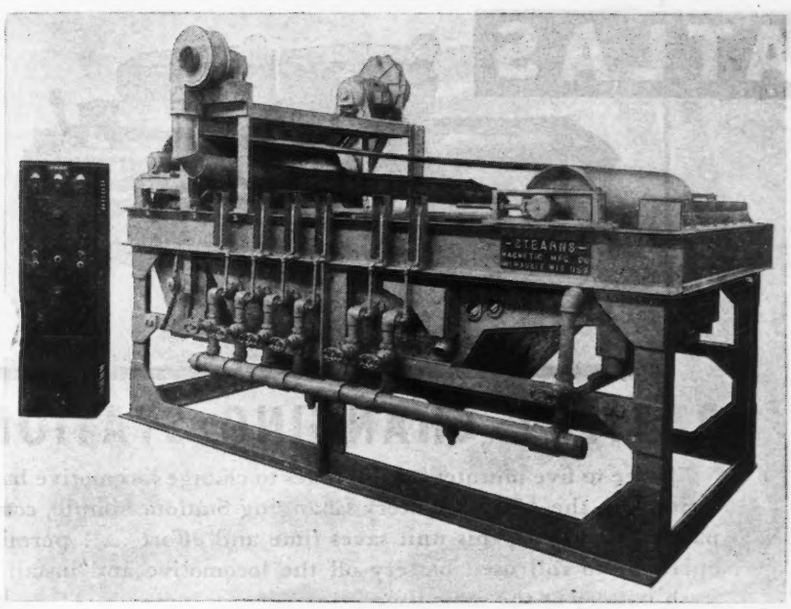
★The critical effect of Canada's manpower problem is shown by production figures for the first half of 1944, published by the Dominion Bureau of Statistics. Nickel is down to 138,773,912 lb. from 150,442,741 lb. in the first half of 1943, with recovery in June down to September 1939 level. (International Nickel, in spite of its A classification, was reported in August to be 1,800 men short.) Lead is down to 152,234,710 lb. and zinc to 267,059,405 lb., compared with production in the first half of 1943 of 239,637,846 lb. and 312,091,853 lb., respectively. Lead output in June was less than 20,000,000 lb., compared with 39,300,000 lb. in the same month a year ago. Zinc recovered dropped to 39,700,000 lb. in June this year, against 53,300,000 lb. in June, 1943. The downward trend was reversed only in gypsum, salt, and feldspar.

★Labrador Mining & Exploration Co., controlled by Hollinger Consolidated Gold Mines, with which is associated the M. A. Hanna Co., reports that extensive surface work on the high-grade iron deposits, for which six diamond drills are available, was started in July. The cores are shipped to Timmins, Ont., for analysis. Intersections of high-grade ore have been secured from a vertical hole drilled to a depth of 250 ft. on the extensive iron deposit near the base camp on Sandgrit Lake.

QUEBEC

★The Pontiac property of Anglo-Rouyn Mines has been under exploration with the diamond drill since the first week in March. Situated in Rouyn Township north of Powell Rouyn Gold Mines, it has indicated ore amounting to 115,000 tons averaging $6 a ton. The sale of treasury stock has provided $75,000 for the present work, which is intended first to check results of previous drilling to a maximum depth of 500 ft. and, later, to explore extensions laterally and at depth.

★W. B. Maxwell, president of Beattie



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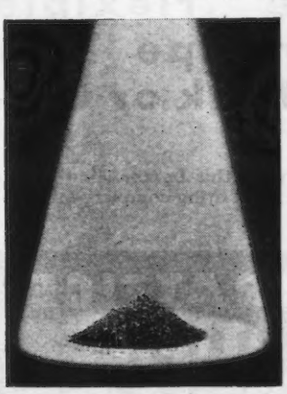

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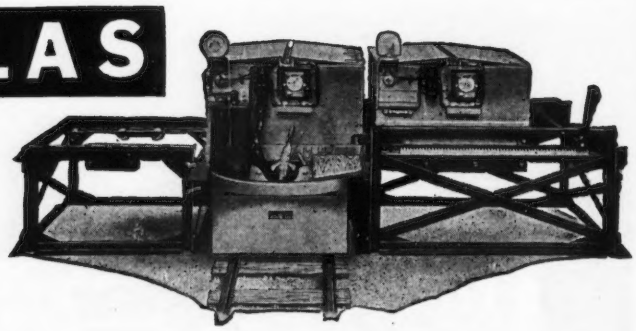

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Canada (*continued*)

Gold Mines, reports a net loss of $6,935 in 1943, compared with net profits of $467,957 in 1942, after all write-offs. Grade of ore was down from $3.75 a ton in 1942 to $3.40 last year, when the total value of ore put through the mill was $1,017,877, compared with $2,463,309 in 1942. The 4c. dividend last year brought total disbursements since 1936 to $4,435,022. Mining was stopped on June 16, 1943, as a result of the slump of a large volume of overburden into the opencut and underground workings. Milling was resumed in December at about 600 tons a day, and this rate gradually is being increased. The mine manager, Jay Tuttle, reported the discovery of a promising section of new ore on the seventh level. On the fourth and fifth levels, 167,840 tons of gray porphyry ore was added to reserves and 75,950 tons in the block between the seventh and ninth levels. Drilling has disclosed a continuous ore length of 2,300 ft. in the Donchester area, the grade averaging 0.28 oz. gold across 7 ft.

★Since September, 1943, Golden Manitou Mines has been marketing lead-silver concentrate with American Smelting & Refining Co., the installation of a lead recovery plant at the mine having improved silver recovery from 40 to 60 percent. Silver output last year amounted to 489,932 oz. and 428,349 lb. of lead was recovered. In the same period the mine shipped concentrate to the United States containing 42,061,367 lb. of zinc, 58,963 lb. of copper, and 11,807 oz. gold. Precious metal content is adequate to defray mining and milling costs of $3.80 a ton. Last year production averaged 835 tons a day, which has since been advanced to about 1,000 tons. Ore grade now being handled is said to be higher than the $6.36 per ton reported for last year. Andrew Robertson is mine manager.

★Extensive exploratory work has been in progress this season in the Northwestern Quebec area lying east of the Beattie and Noranda mines, which is the ground represented by two map sheets and a preliminary report by G. W. H. Norman recently published by the Canada Geological Survey. Dr. Norman makes the following comment: "If an important fault zone extends eastward from the Porcupine belt to the Beattie belt, in central Duparquet Township, it splits into two branches near the southeast corner of Destor Township. . . . The common occurrence of ore deposits near major fault zones suggests that these structures merit prospecting."

★Promising gold possibilities have been disclosed on the large property of Hosco Gold Mines by cores secured from the first eight holes of an extensive drilling program that is now in progress. The ground is located near McWatters Gold Mines, about 8 miles east of Noranda. Large tonnage, low-grade possibilities have been indicated along a zone that averages 33.2 ft. in width. Test holes

have reached a maximum depth of 380 ft. To date, the average grade indicated is about $3.85 a ton. The work is being directed by W. J. Hosking, manager of McWatters.

ONTARIO

★Steep Rock Iron Mines reports that thus far 120,000 cu. yd. of overburden has been stripped from the "B" ore zone, using monitors, suction dredge, and a 2½-cu. yd. shovel with trucks. Efforts are being made to ship 300,000 tons of ore this season, starting Aug. 21 at the daily rate of 1,000 tons and increasing to 5,000 tons on Sept. 15. A haulage road into the pit has been completed and the crushing and loading terminal will be ready in August. The water level in Midwest Arm had been lowered 111 ft. at the end of July, delays having been caused by slides near the pump barges. Occasional spots of ore were reported exposed early in August. The dock which is being built at Port Arthur is not expected to be ready for shipping Steep Rock ore before the end of this season. Foundation piling has been finished and concrete is poured for the new dock. This will be 600 ft. long and 84 ft. high, with a 30,000-ton storage capacity. It occupies the site of the old blast furnace of the Atikokan Iron Co.

★Development on the new 2,900-ft. level of Buffalo Ankerite Gold Mines has yielded increased reserves. Drilling indicates a persistence of the ore zone farther to the south, widths averaging about 15 ft. At the 3,200 level an exploratory drive has reached the Ankerite north group, which is separated by one claim from the main property, and diamond drilling has been planned to test possibilities. Within the area being investigated it is believed that the ore zone of Aunor Gold Mines dips into the Ankerite ground. The mine superintendent is E. C. Keeley.

★W. G. Armstrong, president of McKenzie Red Lake Gold Mines, in western Ontario, states that mine output has been lowered as a result of increasing shortage of labor. Ore milled in the second half of 1943 was 43,534 tons and in the first six months of 1944 the volume dropped to 41,459 tons. Gold recovery dropped in the same period from $11.14 to $9.50 a ton, the lower grade resulting from the restricted mining program and the increasing proportion of development rock milled. On the 1,250-ft. level it is reported that high-grade ore has been opened up, an average width of 15 ft. having been established for the oreshoot. Additional ore has been indicated on the 650-ft. level.

★Slow progress has been made at Macassa Mines in Kirkland Lake in deepening the main winze. The shortage of workers is expected to lead to further reductions in mine output through the second half of the year. Robert A. Bryce, president, states that continued falling off in tonnage produced has cut into profits and has made it necessary to lower the dividend.

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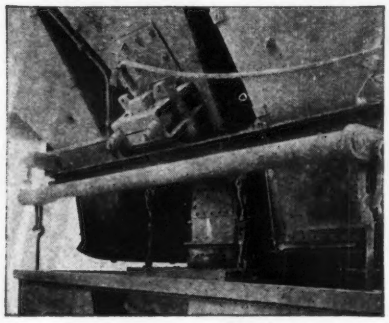

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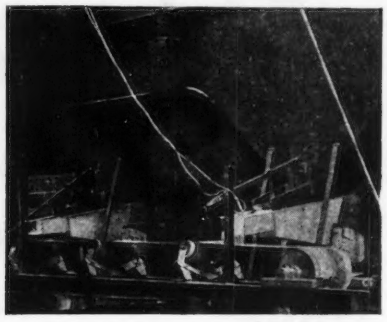

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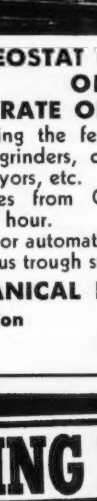
Fig. 2



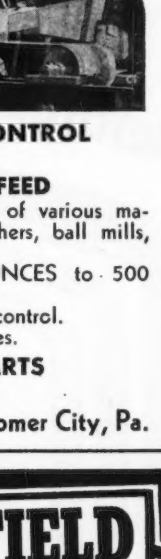


Fig. 1 *Type KB air circuit breaker for mining service, available for both a-c and d-c circuits.*

Fig. 2 (above) shows a Type KSA automatic reclosing circuit breaker for substation service. Fig. 3 (right) is a Type KSC automatic reclosing circuit breaker for sectionolizing service. Steel enclosure is open.

Fig. 3

Fig. 4

Fig. 5 *Type LDR Load Distributor, panel mounted, in glass front, dust-proof cover.*

I-T-E CIRCUIT BREAKER CO.

Representatives in Principal Mining Areas

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Canada (*continued*)

★The discovery of gold in Tweedsmuir Park, in the extreme southwest corner of the Omineca mining division, is the center of interest in British Columbia mining at present. On the strength of representations made by prospectors, Pioneer Gold Mines of B. C., Ltd., last fall took an option on the Harrison group of mineral claims on the north shore of Lindquist Lake, to the west of Whitesail Lake. Last month an examination was made by the company's geologist, who found a huge quartz vein carrying values in scheelite, and parallel thereto another vein carrying its principal values in gold and silver. A continuous series of outcrops gave a length of 1,650 ft. and an average width of six ft. Preliminary sampling, later confirmed by resampling, gave average assays of 0.35 oz. gold and 10 oz. silver per ton. Privateer Mine, Ltd., which had taken an option on the Chickamin gold-silver-lead-zinc group on the south shore of Whitesail Lake, has staked additional ground, including both ends of the Pioneer discovery and another group about one mile up Boulder Creek from Lindquist Lake. Privateer also has a strong quartz lead, which in places reaches a width of 40 ft. The Consolidated Mining & Smelting Co. of Canada, Ltd., has staked a large low-grade gold property at the northwest end of Whitesail Lake. Quebec Gold Mining Corp. and International Mining Corp. of Canada are also active in the field, as well as a large number of independent prospectors. A diamond drill has been shipped to the Privateer holdings to be used under the direction of Walter Lammers. Five miles of trail are being constructed, and stripping is under way at the Pioneer discovery group under the direction of C. R. Cox. The Whitesail district is easily accessible, being reached by highways which extend from Burns Lake and Houston, on the Prince Rupert branch of the Canadian National Railways, to Wistaria, on Ootsa Lake.

BRITISH COLUMBIA

★A contract has been signed for the delivery of 60,000 tons of barite for use as ballast in special maintenance ships being constructed in west coast shipyards. The mineral is to be mined from an extensive deposit at Parsons, in the Golden mining division, where production for some years past has been designated for supplying the needs of oil-well drilling in Alberta. The contract has been awarded to the Northern Construction Co., Ltd., and J. W. Stewart, both of Vancouver, who have sub-contracted with G. W. Ledingham & Co., Ltd., to mine the material by agreement with Summit Lime Co., of Lethbridge, Alta., owners of the property. Mining will be done by open-pit methods using steam shovels and bulldozers. The deal was consummated through the co-operative offices of the British Columbia and Yukon Chamber of Mines, and barite was accepted by the shipbuilders because it has the

necessary weight and is chemically inert.

★A delegation from the International Union of Mine, Mill and Smelter Workers recently interviewed the British Columbia Government, requesting the following amendments to Acts now in force in this Province.

Workmen's Compensation Act—It was requested that blanket coverage be given all industries and blanket coverage be extended to all injuries; that the rate of compensation be increased from 66⅔ percent to 100 percent; that compensation for dependent children be increased from $12.50 to $20 per month; that maximum compensation be increased to $20 per week during period of disability; and that the maximum compensation ceiling of $2,500 be removed.

Metalliferous Mines Act—It was urged that certificates of competency be required before the appointment of a shift boss or officer of superior rank; that inspection following a mine accident include a representative of the workers; that mine inspectors be required to have metalliferous-mining experience; that standards be set for lodging quarters; and that operators be required to supply blankets.

Coroner's Act—An amendment was sought to compel notification to unions of the time and place of inquests concerning men killed in industrial accidents; and cross-examination privileges for unions together with the provision of witnesses.

★Directors of B. R. X. (1935) Consolidated Mines, Ltd., have accepted an offer of $12,500 for 100,000 treasury shares. This brings to $25,000 the cash available for the present diamond-drilling program. The purchaser has been granted an option to buy the remaining 1,150,000 treasury shares at prices ranging from 15 to 50 c. per share. If exercised, a gross sum of $362,500 would accrue to the company. A second diamond-drill hole is planned in the vicinity of the one now being driven at the south end of the property, in the Bridge River section of the Lillooet mining division. On the advice of the company's geologists the drill will then be moved to the north end where favorable ground is to be tested.

★Shareholders of Minto Gold Mines, Ltd., have indorsed an agreement whereby Glen C. Hyatt is to purchase 600,000 shares at 3c. per share and acquires an option to purchase a further 400,000 shares at 20c. per share. The funds are to be used for exploration at the company's former gold producer in the lower Bridge River valley. Immediate plans call for diamond drilling and some surface work. Henry L. Hill, who has been granted six months' leave of absence from the exploration department of Bralorne Mines, Ltd., will be in charge of the work.

★A number of additional claims near the Fairview Amalgamated properties, near Oliver, have been acquired by Kelowna Exploration Co., Ltd., operator of the Nickel Plate mine at Hedley,

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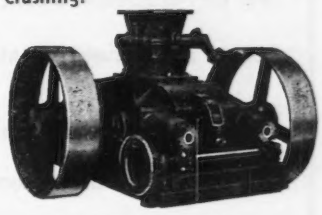

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Canada (*continued*)

Osoyoos mining division. An option of the Fairview properties was taken last fall and a substantial part of the $50,000 purchase price has been paid. Kelowna Exploration is giving serious consideration to the erection of a large mill to undertake production of gold on a much larger scale than anything attempted by previous operators.

★Payment of $413,595 has been made by North American Mines, Inc., of Boston, Mass., to London and Western Trusts in order to make payment of 31½c. per share to the 1,313,000 shares of Gold Belt Mining Co., Ltd., Nelson district gold producer. The shares have been extinguished through the acceptance by shareholders of the Boston company's offer. Of the gross amount, $146,164, equivalent to 5.732c. per share, has been held by the Income Tax Division to be attributable to undistributed profits, and therefore subject to taxation.

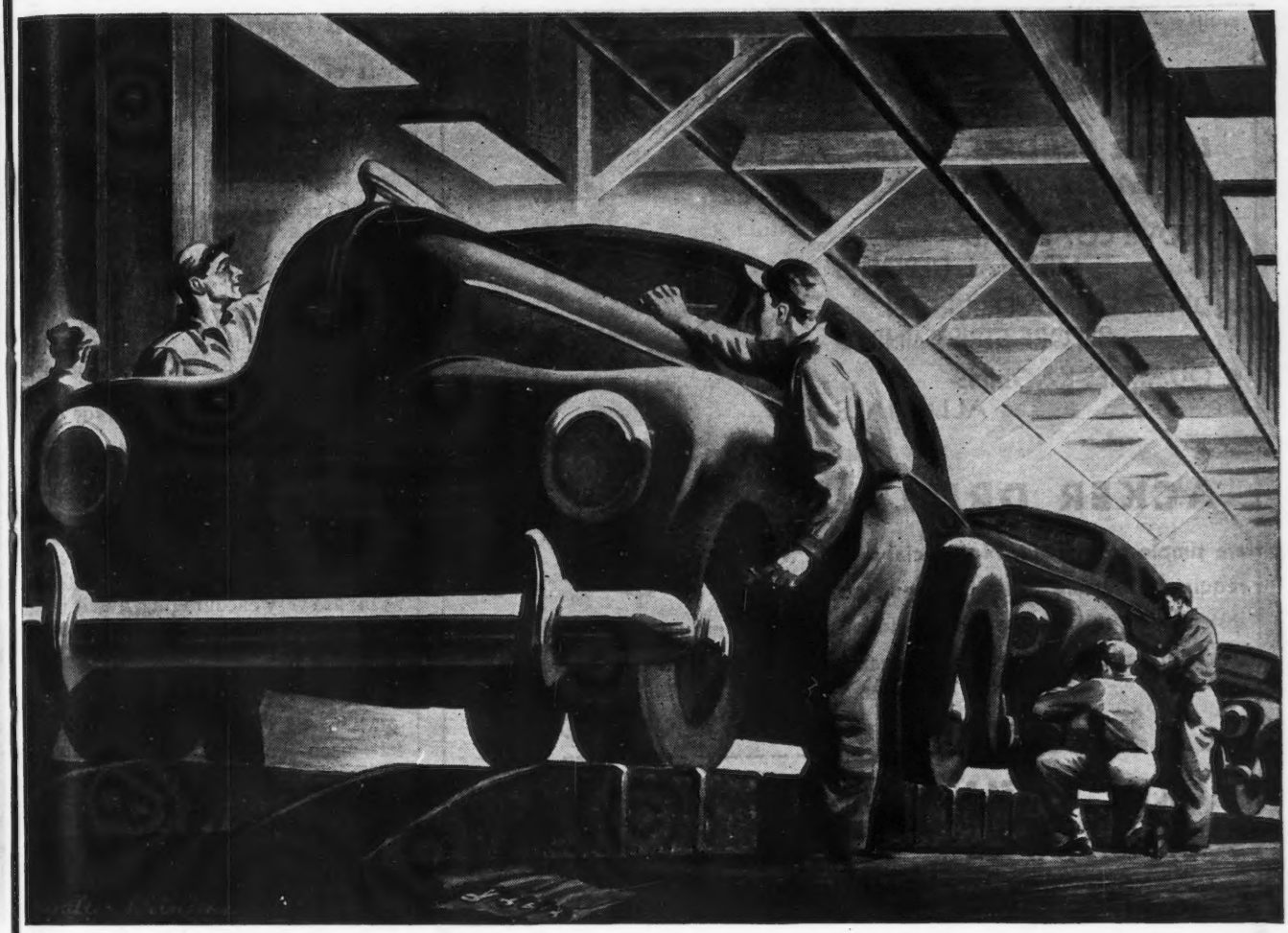
★Production was resumed by Base Metals Mining Corp. Ltd., Golden mining division, on June 15, after a five months' shutdown occasioned by the loss of the power house by fire. Owing to the labor shortage milling was conducted at a rate of 155 tons per day, only 40 percent of capacity. Development work has indicated an additional 10,000 tons of better than 15 percent zinc ore in the Kicking Horse mine.

★Pioneer Gold Mines of B. C., Ltd., Bridge River gold producer, in partnership with Transcontinental Resources, Ltd., has acquired an option on the Ranney group of gold claims in the Yellowknife area, Northwest Territories. This group consists of 14 claims and fractions occupying two miles in the greenstone belt along the West Bay fault. The Goliath claim, detached from the group but closer to the Giant Yellowknife ground where sensational discoveries of gold have recently been made, was obtained in the same deal. Charles Ney has been placed in charge of preliminary development work.

PERU

Equipment received for Banco Minero's custom mill at Huachocolpa

★Machinery for the proposed custom mill to be erected at Huachocolpa by the Banco Minero del Peru arrived in Callao a short time ago. The plant consists of two 5 × 5-ft. Allis-Chalmers ball mills, with Dorr classifiers and Denver flotation cells, and will be operated by three large Ingersoll-Rand diesel engines. The altitude of Huachocolpa is about 14,500 ft., and special designs have been necessary for the engines. The Huachocolpa mining zone, located in the Department of Huancavelica, some 120 miles inland from the



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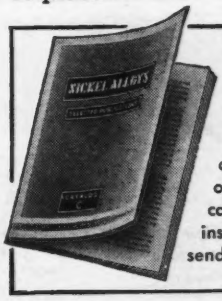

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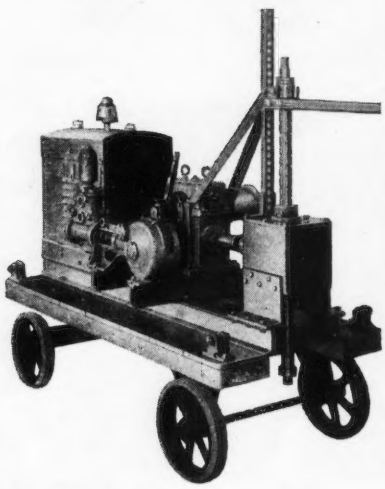

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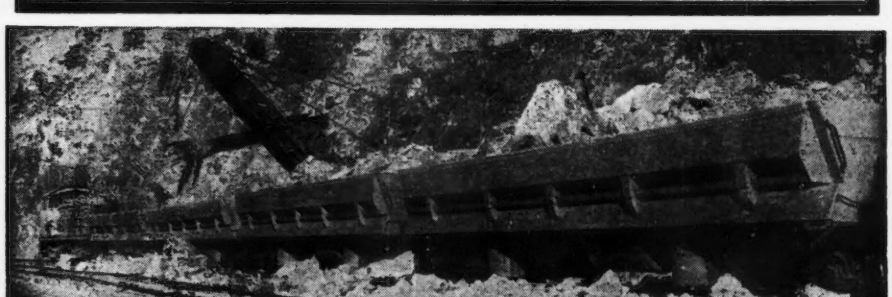

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FINDLAY, OHIO

Peru (*continued*)

port of Pisco, has been known from the time of the Spanish Conquest; concentration, however, has always been limited to the sorting of high-grade ore for export. The Banco Minero made a thorough investigation of the region about two years ago and recommended the installation of a 150-ton selective flotation plant. Because of difficulties with priorities, the machinery was delayed in coming. The plant will be erected at a point above Escalera, equidistant from the Rublo, Peseta, Galena, Emita, and Caudalosa mines. These five mines alone have large reserves of medium-grade lead-silver-zinc ores.

★The properties of Compania Minera Huaranguillo, located in the district of Santa Lucia, in the Department of Ica, about 100 miles inland from Nazca, have been undergoing intense development for the last two years. Results so far are very encouraging, and it might yet prove to be one of the richest gold mines in Peru. Ore developed already amounts to about 90,000 tons with 0.7 oz. gold per ton.

★Minas de Cercapuquio, S. A., which has been working a large lead-zinc-cadmium deposit about 50 miles south of Huancayo, in the Department of Junin, is about to start operations with its new zinc flotation plant. Cercapuquio has been producing lead concentrates for several years; zinc and cadmium, which are intimately mixed in the ore, have not been recovered so far. The new plant has a capacity of 100 tons a day. Ore reserves are 150,000 tons in sight, carrying 20 percent lead, 24 percent zinc, and 0.5 percent cadmium.

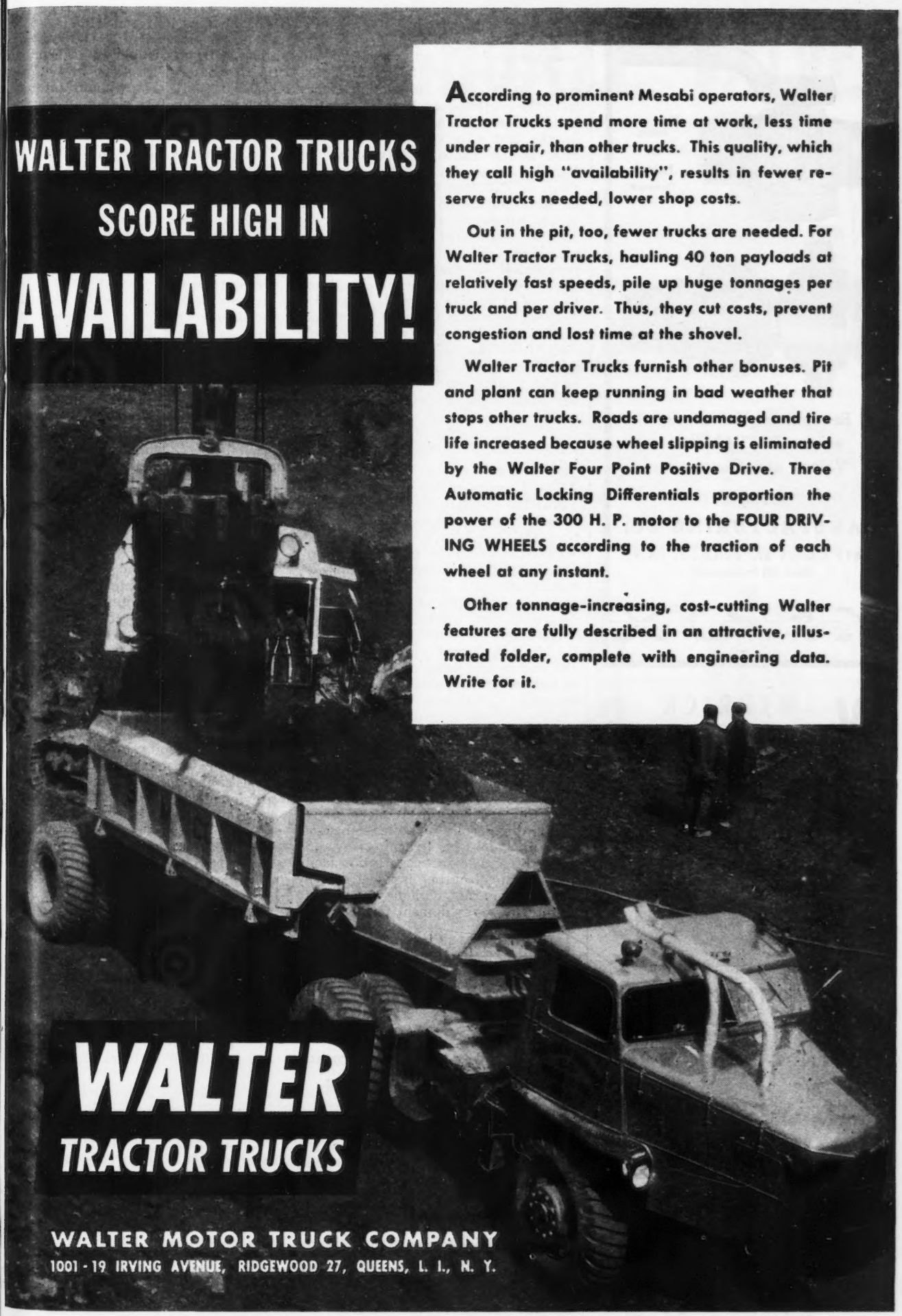
★The Peruvian government has recently approved a project for the construction of a highway from Rio Blanco to Chanape, with a view to the development of the Chanape-Germania mining region. This zone, like many others in Peru, has been limited in its production to the hand-picking of high-grade ores. The Banco Minero is at present studying the several mines and contemplating the installation of a custom mill. The center of the mining region is only about 100 miles east of Lima. Ores are mainly gold and silver. Chanape mine alone is said to have 60,000 tons of ore carrying 25 oz. silver, 0.4 oz. gold, and 8 percent lead. Other veins are reported to carry high values in copper.

BRAZIL

World's largest producer of tantalite—Charcoal iron furnace under construction

★Brazil is now the world's largest producer of tantalite, the output last

WALTER TRACTOR TRUCKS SCORE HIGH IN AVAILABILITY!



According to prominent Mesabi operators, Walter Tractor Trucks spend more time at work, less time under repair, than other trucks. This quality, which they call high "availability", results in fewer reserve trucks needed, lower shop costs.

Out in the pit, too, fewer trucks are needed. For Walter Tractor Trucks, hauling 40 ton payloads at relatively fast speeds, pile up huge tonnages per truck and per driver. Thus, they cut costs, prevent congestion and lost time at the shovel.

Walter Tractor Trucks furnish other bonuses. Pit and plant can keep running in bad weather that stops other trucks. Roads are undamaged and tire life increased because wheel slipping is eliminated by the Walter Four Point Positive Drive. Three Automatic Locking Differentials proportion the power of the 300 H. P. motor to the FOUR DRIVING WHEELS according to the traction of each wheel at any instant.

Other tonnage-increasing, cost-cutting Walter features are fully described in an attractive, illustrated folder, complete with engineering data. Write for it.

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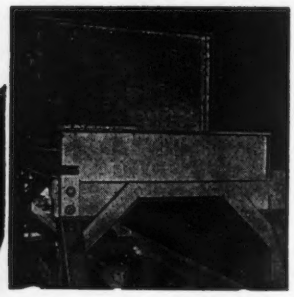

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The Merrick Weightometer provides a continuous, automatic accurate weight record while material is in motion on conveyor. It weighs without interrupting conveyor service.

Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

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MERRICK SCALE MFG. CO.
PASSAIC, NEW JERSEY, U. S. A.

Brazil (*continued*)

year amounting to 60 percent of the Ta_2O_5 consumed by the metal industries. Most of the production comes from the northeastern Brazil pegmatite belt, a new mining district developed in the last two years. The largest mine is the Taboas, in the State of Paraiba, near the road connecting Picui to Parelhas, close to the border of Rio Grande do Norte. Tantalite occurs in pegmatites in the metamorphic schists. Associated minerals of value are beryl and columbite, the usual paragenesis in that district. Taboas mine is operated by the Silveira Brazil Co., of Campina Grande. Paraiba. Another important mine for its production of tantalite and beryl in the same district is Tanquinhos, near Picui, Paraiba. Production from this property has amounted to 1,000 tons of beryl and 12 tons of tantalite-columbite containing 45 percent Ta_2O_5 and 37 percent Nb_2O_5. Tanquinhos vein outcrops for 500 ft. and the maximum thickness is 90 ft.

★The Urucum manganese mine, near Corumba, in Mato Grosso, constitutes Brazil's largest reserve of manganese ores and one of the world's biggest. Blocked-out reserves, reported by Prof. Otavio Barbosa, Escola Politecnica de Sao Paulo, are 2,000,000 tons, and estimated reserves are placed at the 10-million-ton level. The ore contains about 10 percent iron and from 0.12 to 0.18 percent phosphorus. Near the manganese deposits, large reserves of 56 percent iron ore have been studied recently. Total iron ore reserves, including the lower grades, are believed to reach four billion tons. To meet the pig-iron requirements of the surrounding area, a charcoal blast furnace of 60 tons' per day capacity is under construction. This will be the first blast furnace built in Western Brazil. The exploitation of both manganese and iron ores in Urucum is handicapped by lack of transportation facilities. A small output is being sent by boat down the Paraguay River to Montevideo for shipment to the United States.

AUSTRALIA

Gold production declined in 1943 due to manpower shortage —Outlook more encouraging

★A complete summary of Australian mining for the year cannot be given as statistics of base metal mining are still withheld from publication. The annual report of the Australian Mines and Metals Association, however, gives some information on production as well as on industrial matters affecting the industry. The gold mining section of metalliferous mining suffered most from manpower withdrawals. In Western Australia gold production fell to approximately 550,000 oz. in 1943, compared with 850,000 oz. in 1942 and 1,100,000 oz. in 1941. At the end of 1943 there were about 4,200 men employed in the industry, compared with 4,500 in 1942 and 10,000 in 1941. Many important mines have been forced to close and development has either ceased, or is on a very limited scale on mines still operating. The position is similar in Victoria. In 1941, 149,769 fine oz. of gold was produced, the output falling to 101,497 oz. in 1942 and 56,511 oz. in 1943. Whereas before the war, there were about 3,000 men employed in gold mining, there were 458 in 1942 and less than 300 in 1943. The number of mines working in the State in 1939 was 150, but in 1943 the number had declined to 12, and in the Bendigo field three mines are operating as against 35 in the first year of the war.

★The gold mining industry throughout the Commonwealth has been free from major industrial disputes and the position in the base metal section has generally been similar. Despite difficulties in the metalliferous mining and smelting in New South Wales production was reasonably well maintained.

★In Tasmania industrial relations have been uniformly good but operations have been retarded by shortage of labor for production of copper, lead, zinc, tin and other metals required for war purposes. Man-power shortage in the Tasmanian industry approximated 400 men. Generally, there is a restlessness throughout the Commonwealth that cannot be overlooked. Labor is scarce and in great demand, and wages are high, though nominally pegged. Jobs in the more essential industries are also pegged but despite this, it is practically impossible for management successfully to insist on retaining employees. Ways are found by discontented workers to leave their employment, frequently resulting in serious loss of key men. The employer cannot dismiss an employee in a protected industry without the greatest difficulty, and to the serious detriment of discipline and efficiency. Civilian goods are in very short supply and services are greatly reduced, consequently the worker has fewer directions for spending his greatly increased earnings than in peace-time. The effect of these factors is the introduction of a disturbing element into the relations between employers and employees, particularly fostered by the removal of control and discipline from the employers.

★A new feature in industrial legislation is the bill before the Commonwealth Parliament entitled "The Unemployment and Sickness Benefits Bill." This is to provide for monetary payments to persons unemployed or suffering from sickness. The scheme is on a non-contributory basis, a feature which has been strongly contested, the prescribed payments to be made out of consolidated revenue. Rates of benefit for unemployment or sickness are on the basis of £1 5s. for a man, £1 for his wife, and 5s. for one dependent child,

WALWORTH BRONZE VALVES

No. 225P GLOBE, 500 Brinell Seat and Disc

No. 448PF GLOBE, Marine Service Valve.

No. 95 GLOBE, Re-new Disc

No. 420 SWING CHECK, Regrinding Valve

No. 1736 BRONZE, Lubricated Plug Valve

No. 256 GLOBE, A.A.R. Locomotive Valve

No. 328 GLOBE, with Walseal Ends 3000 lb. O.W.G.

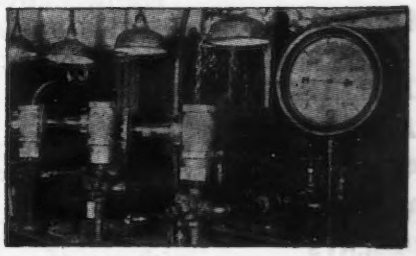
No. 29 GATE, Double Disc-Taper Seat

No. 11 GATE, One-Piece Wedge

Walworth's *complete line* of bronze valves, a number of which are illustrated above, includes types designed to fit every service where bronze valves are required. Strict laboratory supervision of the physical, chemical, and metallurgical properties of the materials entering into all Walworth products is supplemented by continuous inspection of the manufacturing operations, both as to accuracy and quality of finish, and by rigid final inspection and testing of each individual product.

Walworth manufactures a complete line of valves and fittings in steel and iron, as well as bronze. Cast iron pipe and three types of pipe wrenches are also made. For full details on Walworth products write, on your company letterhead, for a free copy of Walworth Catalog 42.

Testing Seats of Bronze Valves



Assembled bronze valves are subjected to test under pressure—either air-under-water, steam or hydraulic. The hydraulic seat test is shown here. Walworth Quality Bronze Valves undergo a hydrostatic shell test of three times their rated working steam pressures.

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Australia (*continued*)

children in excess of one being provided for in the Child Endowment Act. There is a waiting period of seven days before benefits become payable. The scheme is subject to a means test, an adult being allowed an income of £1 per week in addition to the total amount of benefit receivable. Persons are not entitled to relief if they are direct participants in a strike. Strong, though unsuccessful efforts have been made to secure the recognition of the principle of an allowance for ore depletion when assessing the taxable income of mining companies. The Commonwealth Government declines to recognise this principle, though an exemption of 20 percent. of tax has been allowed in the case of mining companies producing certain prescribed base metals urgently required for war purposes, these prescribed metals not including lead, zinc and silver. The 20 percent. exemption allowance is unsatisfactory, for the industry desired to have established the inherent difference between mining, which has a steadily diminishing asset, and the ordinary industries whose assets remain undiminished over the years of their activities.

WESTERN AUSTRALIA

★The Western Australian mining industry in 1943, is summarised in the annual report of the Chamber of Mines. Conditions brought about by the war have caused a steady reduction in the tonnage of ore mined and treated and in this regard, 1943 showed a marked decline in comparison with 1942, though, rather unexpectedly, dividends paid by the gold mining companies increased. A comparison of the two years is given below:—

	1942	1943
Ore treated: long tons	3,225,704	2,051,011
Gold produced: fine oz.	845,772	531,747
Normal value of production (£4.24773 per oz.)	£3,639,476	£2,258,718
Dividends paid:	£423,712	£597,546

The price paid for gold, after deduction of the Commonwealth Gold Tax was £A9 14s. 6d. per oz. Companies which mined and treated more than 100,000 tons of ore for the year were:—

	Ore Treated Long tons	Gold Recovered Fine oz.
Wiluna Gold Mines Ltd.	479,069	52,377
Great Boulder Pty. Gold Mines Ltd.	283,201	63,302
Lake View and Star Ltd.	260,720	87,196
Moonlight Wiluna Gold Mines Ltd.	100,577	17,790

Nine mines produced between 100,000 tons and 50,000 tons of ore, and 10 were between 50,000 tons and 5,000 tons. All mines worked at greatly reduced scale owing to restriction of labor and very little development work was possible. The curtailment of operations may be judged by the employment figures. In years immediately preceding the war, the industry employed approximately 15,000 men, but in 1943 the total was 4,155. The opinion is held that the Commonwealth Government is now likely to view the industry more favorably in view of altered circumstances and more men may be made available for the industry. As the result of the heavy withdrawal of man-power from the industry many townships have been practically ruined, but a recognition of the fact that gold mining will play a large part in post-war rehabilitation may lead to an improvement in general conditions. The year 1943 was free from serious industrial troubles, but in the first four months of 1944 the mines of the Kalgoorlie field have been seriously affected by two strikes of woodcutters employed by the Goldfields Firewood Supply Ltd., which supplies the Kalgoorlie Electric Power and Lighting Corporation which in turn supplies electric power to all but two mines, which operate diesel power plants. An important feature of the Chamber's activities is the Kalgoorlie and Boulder Mines Medical Fund and Welfare Scheme, which provides for free hospital services to employees of the local mines and their dependents.

NEW SOUTH WALES

★New Occidental Gold Mines N.L., which operates the New Occidental mine, working a clean gold ore, and the New Cobar and Chesney gold-copper mines at Cobar, earned a net profit of £A10,514 in the year ended November 28, 1943, before providing for depletion of mines and depreciation of plant. Operating results were not made available but the gold mining section—the New Occidental mine—was worked on a reduced basis. Profit was less than in the previous year due mainly to an increase of £A58,308 in working costs caused chiefly by increasing copper output for national needs. The cost of extracting copper ore was double the normal cost of extracting gold ore, and the altered policy was responsible for a fall in gold production of 5,271 oz. which the higher-costing copper return did not offset. The New Occidental ore body is about 650 ft. long by 90 ft. wide and has a mean assay value of 7 dwt. gold per ton, there being no copper in the ore. The New Cobar mine, adjoining on the north, has two orebodies, each less than half the width of the New Occidental lode, the main orebody assaying about 7 dwt. gold and 1.3 percent. copper. The second orebody, the Jubilee, has been recently explored at a cost of £A12,000 but work has now ceased. The New Cobar ore reserve position is stated to be unsatisfactory and a diamond drilling programme is being commenced to explore the continuation of the lodes at greater depth. The Chesney mine was re-opened to help toward increasing the national copper output, but operations resulted in a loss. Development in all mines was restricted by manpower difficulties.

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The heat treatment of many materials in the process industries has been simplified and made more efficient through the use of Nichols Herreshoff Mutiple Hearth Furnaces.

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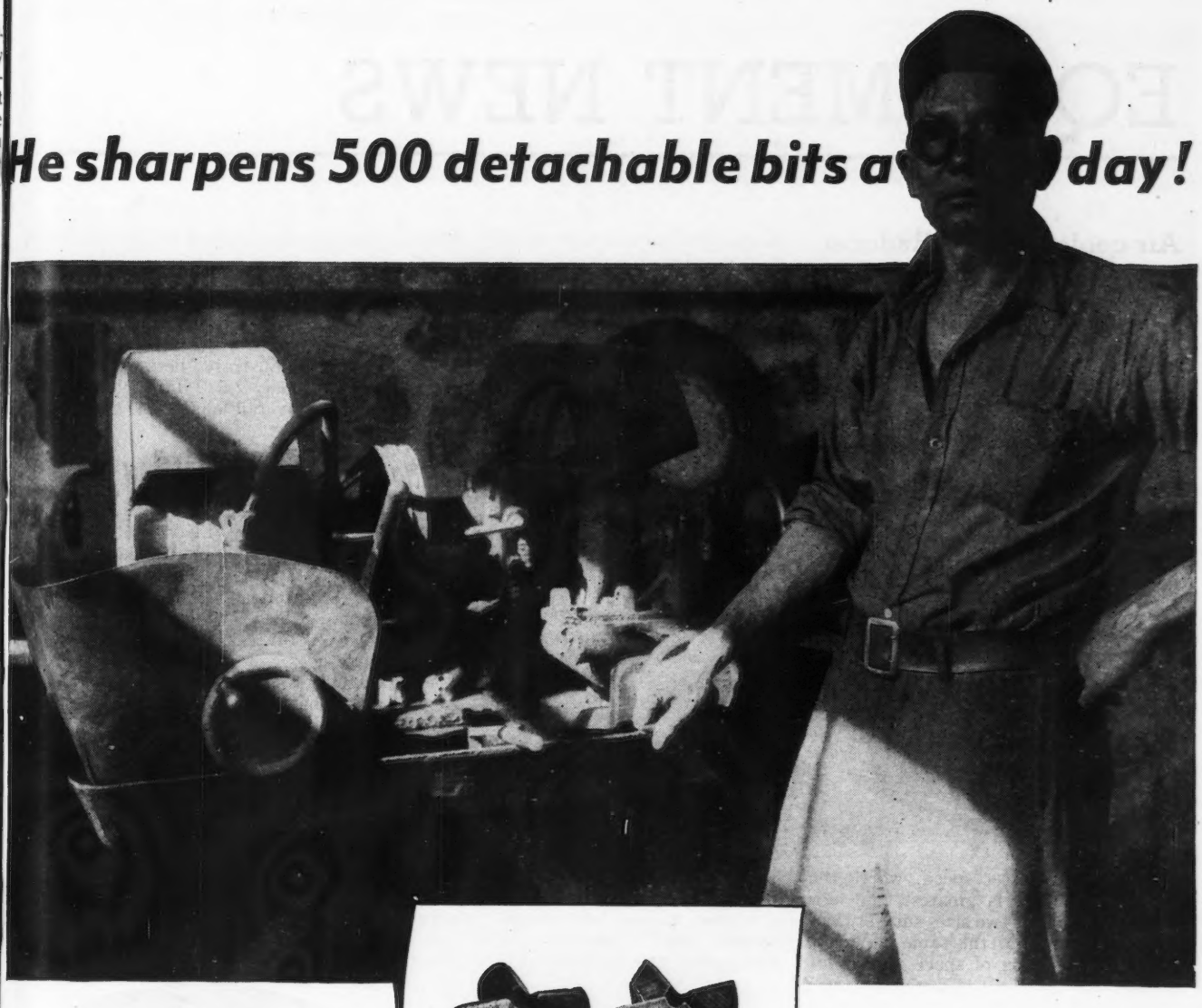
He sharpens 500 detachable bits a[illegible] day!



BEFORE GRINDING AFTER GRINDING

That sounds like a mighty big order, but the job is done every day by grinders who use *Aloxite* Wheels by Carborundum. In order to receive the maximum efficiency and production from detachable bits, it's necessary to get and *keep* a good cutting edge on them. These grinding wheels cut free and cool, and preserve the temper of the steel, so the bits can remain in service for longer periods.

Detachable bits reduce steel shop costs and nipping charges, and eliminate the need for taking steel in and out of working spaces. So you save time and labor, speed production, and cut drilling costs when you keep your detachable bits properly ground with Grinding Wheels by Carborundum.

The Carborundum Company, Niagara Falls, New York.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Buffalo, Pittsburgh, Cincinnati, St. Louis, Grand Rapids

Grinding Wheels by CARBORUNDUM

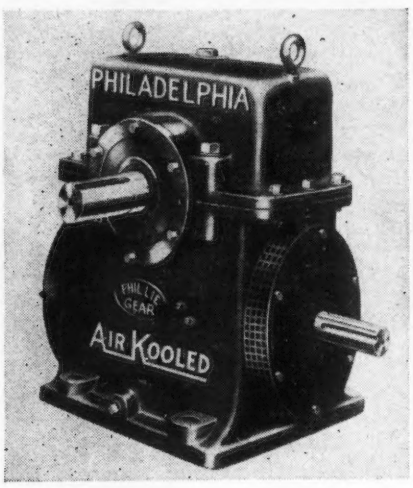
TRADE MARK

(Carborundum and Aloxite are registered trade marks of and indicate manufacture by The Carborundum Company)

EQUIPMENT NEWS

Air-cooled Speed Reducer

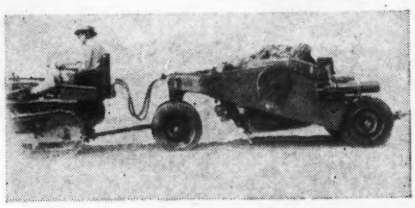
By dissipating the heat generated in the oil bath of its new AirKooled worm gear speed reducer, Philadelphia Gear Works, Philadelphia 34, Pa., has approximately doubled the horsepower ratings for worm speeds of 580 to 1750



rpm. At the latter speed, where the rating advantage is greatest, the new unit will be about two sizes smaller than a standard unit of the same capacity, resulting in saving of space and about 40 percent reduction in weight. Heat is dissipated by drawing cooling air through the double-walled ribbed housing with a suction fan mounted on the worm shaft.

Scraper Designed for Airborne Transport

Developed especially for U. S. Airborne Aviation Engineers, but adaptable to many peace time uses, is the new Airborne scraper now being made by LaPlant-Choate Mfg. Co., Cedar Rapids, Ia. This novel unit, of light weight and $1\frac{3}{4}$ to 2 cu. yd. capacity, can be loaded into a transport plane, and may find a variety of uses at mining operations in isolated regions where air transport is



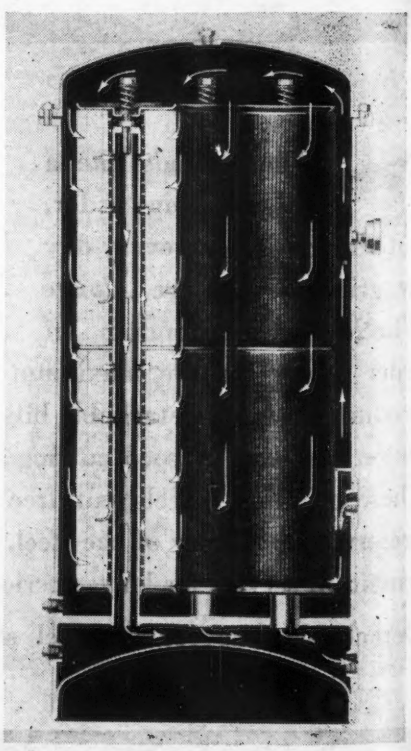
available and a light-weight tractor-scraper unit is desirable. Both bowl and apron are hydraulically operated from a pump located on and driven by the tractor. A three-position valve raises, lowers, and holds the cutting edge in position and exerts the necessary down pressure, thus placing the total weight of the scraper on the cutting edge. As illustrated herewith, shipping weight is only 2,520 lb. Overall width is 64 in.; overall length, 147 in.

New Power Battery

Supplementing the company's Exide-Ironclad battery, Electric Storage Battery Co., Philadelphia 32, Pa., has made available a new battery designated Exide-Powerclad. A feature of the new design, which has been developed to relieve shortages, is a plate completely enclosed by a slotted polystyrene retainer. The net result is a motive power battery of maximum capacity in minimum space consistent with long life expectancy.

Diesel Oil Clarifier

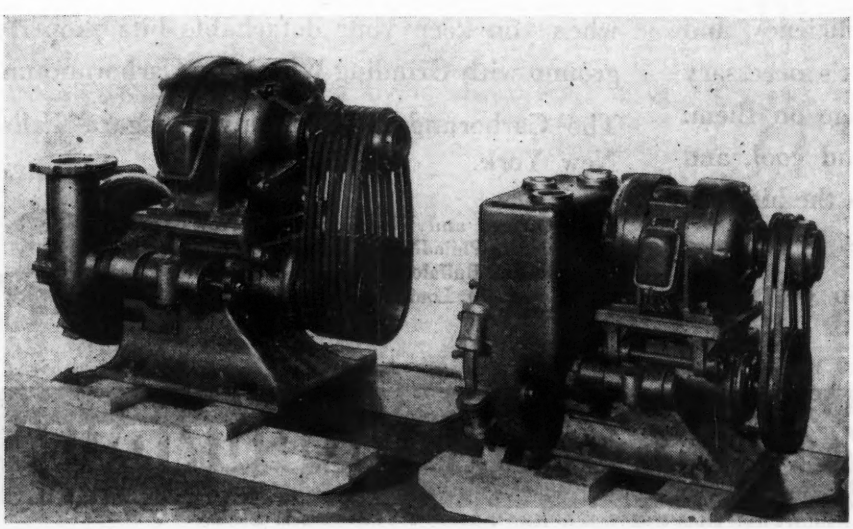
Briggs Clarifier Co., Washington 7, D. C., announces a complete standard line of fuel oil filters for diesel engines, with flow capacities up to 500 gal. per



hr. For small high-speed diesels where pressures sometimes run well above 50 p.s.i., the clarifier is designed for a maximum working pressure of 100 p.s.i.

Pump Motor Mounted Overhead

A new departure in the design of its centrifugal pumps is shown in the accompanying illustration of Amsco-Nagle pumps made by the American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill. By mounting the motor overhead it becomes more accessible, less liable to flooding, and affords a combination requiring less floor space. The pump can be operated at more accurate speeds, and speed changes can be provided to meet the demands. The pumps illustrated are a 5-in. type T (left) and a 2-in. type A.



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REVOLUTIONARY NEW "PHILCO THIRTY" GIVES 30% LONGER LIFE!

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At last, a mine locomotive and shuttle car battery with a revolutionary, new construction that actually gives you *30% longer life . . . and more!* A brand new principle of fabricated insulation developed after years of research in the Philco laboratories, and now introduced after exhaustive tests in actual service. It's the *Philco "Thirty"* . . . your post-war battery, available now in certain types and limited quantities. Write today for full information.

PHILCO CORPORATION, ***Storage Battery Division, Trenton 7, New Jersey***

FOR 50 YEARS A LEADER IN MINE STORAGE BATTERY DEVELOPMENT

and tested hydrostatically at 150. For large heavy-duty engines the maximum working pressure is 40 p.s.i., tested at 60. Pressure drop across the refills ranges from 0 to 5 p.s.i. on all models. Covers and cover gaskets are interchangeable in the various sizes, the gaskets being made of a mixture of cork and synthetic rubber. A pressure gage shows the pressure differential and tells the operator when to change refills.

INDUSTRIAL NOTES

Additional Army-Navy Production Awards have been given to the following firms for continued excellence in war production: **Texas Gulf Sulphur Co.** (fourth); **Josephtown zinc smelter of St. Joseph Lead Co.** (second); **General Electric Co.,** Bridgeport, Conn. (third); **The Foxboro Company** (third); **De Laval Steam Turbine Co.** (fourth); **Independent Pneumatic Tool Co.** (fourth); **Cochrane Corp.** (second); **Handy & Harman** (fifth).

E. E. LeVan has been elected president of **Haynes Stellite Company,** a unit of Union Carbide and Carbon Corporation, succeeding the late Francis P. Gormely.

National Smelting Co., Cleveland, O., announces the appointment of **Wayne Martin** as sales engineer. He was formerly assistant materials engineer for Sperry Gyroscope Co.

John M. McKibben has been appointed assistant to the vice-president of **Westinghouse Electric and Manufacturing Co.** His new responsibility will include all product and industry advertising in addition to his present duties in charge of the company's Application Data and Training Dept.

George S. Tanner has been appointed manager of equipment sales for **National Battery Co.,** with headquarters in the company's offices at St. Paul, Minn.

Mack Trucks, Inc., announces the appointment of **Dr. Walter M. Mitchell** as director of research; also the return as sales promotion manager of **M. C. Horine,** who has been in the automotive division of WPB in Washington.

Athey Truss Wheel Co., Chicago, announces the promotion of **F. B. Lease** from the position of sales manager to that of vice-president in charge of sales.

Jean M. Allen has been appointed hydraulic-dredge consulting engineer to the **Joshua Hendy Iron Works,** Sunnyvale, Calif.

Carborundum Company has opened branch sales offices in Buffalo, N. Y., St. Louis, Mo., and San Francisco, Calif., in charge, respectively, of the following district sales managers: **G. S. Rogers, G. O. Watson,** and **W. T. McCargo.**

Atlas Powder Co., Wilmington, Del., has moved its Philadelphia district sales office to the Empire State building in New York City. **W. C. Manning** has taken charge of the new office, succeeding **E. W. Moorehouse,** who retired July 1.

A. M. Guthrie has been appointed field sales manager of **Buckeye Traction Ditcher Co.,** with headquarters at the company's home office, Findlay, O.

F. F. Sampson, manager, New York branch, **Electric Storage Battery Co.,** retired July 1 after 30 years of service. He is succeeded by **Daniel P. Orcutt** who has been assistant manager since 1921.

Climax Molybdenum Co. has opened offices at 624 Fisher Bldg., Detroit, Mich., to handle the company's sales and service in Michigan, Indiana, and the Toledo district. **V. A. Crosby** will be in charge, and will be assisted by **W. G. Patton.** The company's research work will continue at the laboratories in Detroit under the direction of **A. J. Herzig,** vice-president and chief metallurgist.

Caterpillar Tractor Co., Peoria, Ill., announces the following appointments: **William Blackie** and **W. J. McBrian,** vice-presidents; **W. H. Franklin,** controller; **E. W. Jackson,** general parts manager.

Gordon S. McKenty has been named general sales manager for **R. G. LeTourneau, Inc.,** Peoria, Ill., to succeed **Ed R. Galvin,** resigned to accept the presidency of **Tyson Bearing Corp.,** Massillon, O.

Allen-Sherman-Hoff Co., Philadelphia, Pa., announces the appointment of two pump engineers: **William Hogan,** formerly with Georgia Iron Works, who will cover the Southeastern States, with headquarters at Washington Rd., Augusta, Ga.; and **J. G. Tyger,** formerly with **Pomona Pump Co.,** who will cover the Midwestern States, with headquarters at 407 S. Dearborn St., Chicago, Ill.

Timber Engineering Co., Washington, D. C., announces the opening of a San Francisco service and sales office for the Pacific Coast States under the management of **Alden K. Smith.**

The industrial furnace business of **Monarch Engineering and Manufacturing Co.,** Baltimore, Md., has been purchased by **Fisher Furnace Co.,** Chicago. Combined headquarters and manufacturing facilities will be located for the present in the two existing Fisher plants in Chicago.

Phillips Mine and Mill Supply Co., Pittsburgh, has appointed **P. T. Keebler** as plant manager of the company's industrial car division. Mr. Keebler replaces **R. R. Phillips,** recently commissioned in the Navy.

Federal Electric Products Co., Newark, N. J., has bought the electrical division of **Colt's Patent Fire Arms Mfg. Co.** Manufacture of motor controls and other Colt electrical products will be continued at Hartford, Conn., under the supervision of **Thomas M. Cole,** executive vice-president of Federal.

Hyster Company is the new and shorter name of the Willamette Hyster Company, Portland, Ore., makers of material handling devices. The company has plants in Portland, Ore., and Peoria, Ill., with branch offices in the United States and South America.

BULLETINS

Rotary Pumps. Root-Connersville Blower Corp., Connersville, Ind., has just issued Bulletin 61-B11 on its cycloidal rotary pumps suitable for handling heavy and viscous liquids at heads from 120 to 150 ft.

Wick Feed Oiler. Visible, automatic lubrication to solid, wick, and waste-packed bearings from a plastic reservoir, is announced in Bulletin No. 27-A by Trico Fuse Mfg. Co., Milwaukee Wisc.

Postwar Buying Guide. R. G. LeTourneau, Inc., Peoria, Ill., has prepared brochure G-1060 as an answer to five "pocketbook" questions that should be asked by postwar buyers of earth-moving equipment.

Regulators. Design and construction of Victor single and two-stage reduction regulators used in welding and cutting are described in Form 40 issued by Victor Equipment Co., San Francisco 7.

Refractories. Materials for furnace lining and equipment for applying them are described in a pamphlet issued by Basic Refractories, Inc., Cleveland 15, O.

Hydraulic Handbook. Aldrich Pump Co., Allentown, Pa., has issued a 60-page illustrated bulletin for engineers and others concerned with pumps and hydraulic equipment. In addition to cataloging Aldrich pumps and hydraulic equipment, the bulletin contains complete information and tables on hydraulic matters.

Caterpillar Products. A new 20-page booklet, Form D-41, published by Caterpillar Tractor Co., Peoria, Ill., illustrates the complete line of diesel engines, tractors, and earth-moving machinery, and illustrates their application.

Water Treatment. A folder illustrating and describing its system of water treatment has been issued by the American K. A. T. Corp., New York 17, N. Y.

Cone Crusher. Nordberg Manufacturing Co., Milwaukee 7, Wisc., has published Bulletin 116 entitled "How to get the Most from your Symons Cone Crusher."

Safety Valves. Pop safety valves are the subject of information bulletin 501-A, sent on request to J. E. Lonergan Co., Philadelphia, Pa.

Synthetic Rubber Footwear. B. F. Goodrich Rubber Co., Akron, O., has issued a new catalog section on synthetic industrial footwear, illustrating the products and explaining rationing regulations.

Lubrication. Centralized lubrication systems are described in Bulletin No. 25 just issued by the Farval Corp., Cleveland, O.

Metallizing. A 16-page pamphlet on metal spraying has been issued by the Metallizing Company of America, Chicago, Ill.

Metallizing. Bulletin 46 of the Metallizing Engineering Co., Long Island City 1, N. Y., describes a new gun for metal spraying.

Motor Pulleys. American Pulley Co., Philadelphia 29 Pa., describes the composition, design and manufacturing methods of the company's Hi-Torque pulleys.

Power Transmission. A new 24-page catalog of the American Pulley Co., Philadelphia 29, Pa., gives complete information on the company's flat-belt drive equipment. A separate bulletin is devoted to the company's Speed-Jack variable-speed transmission drive

Diamond Drill Bits. Useful for either core or blasthole drilling, the mechanically-set diamond drill is finding wide application. Various shapes and sizes for different purposes are shown in a brochure by J. K. Smit & Sons, Inc., 157 Chambers St., New York 7, N.Y. Price lists are given for the more common bits.

Belt Conveyor Idler. Link-Belt Company, Chicago, has published a new 16-page illustrated book announcing the "400" idler for various types of belt conveyors. Progress in belt conveyors is illustrated in designs dating back to 1906. Ask for book No. 1915 at main or branch offices.

All-Plastic Goggles. Mine Safety Appliance Co., Pittsburgh 8, has produced new lightweight, comfortable and durable goggles, called "LOOKS." Lenses are of polished sheet plastic, clear or green. Frames also are of plastic material, with ventilation holes in the eye cups. Ask for Bulletin No. CE-25.

Meehanite. Bulletin No. 19 entitled "Meehanite Casting vs. Welded Construction" will be sent on request to the Meehanite Research Institute, New Rochelle, N. Y.